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TOY AND OPERATING MECHANISM THEREFOR

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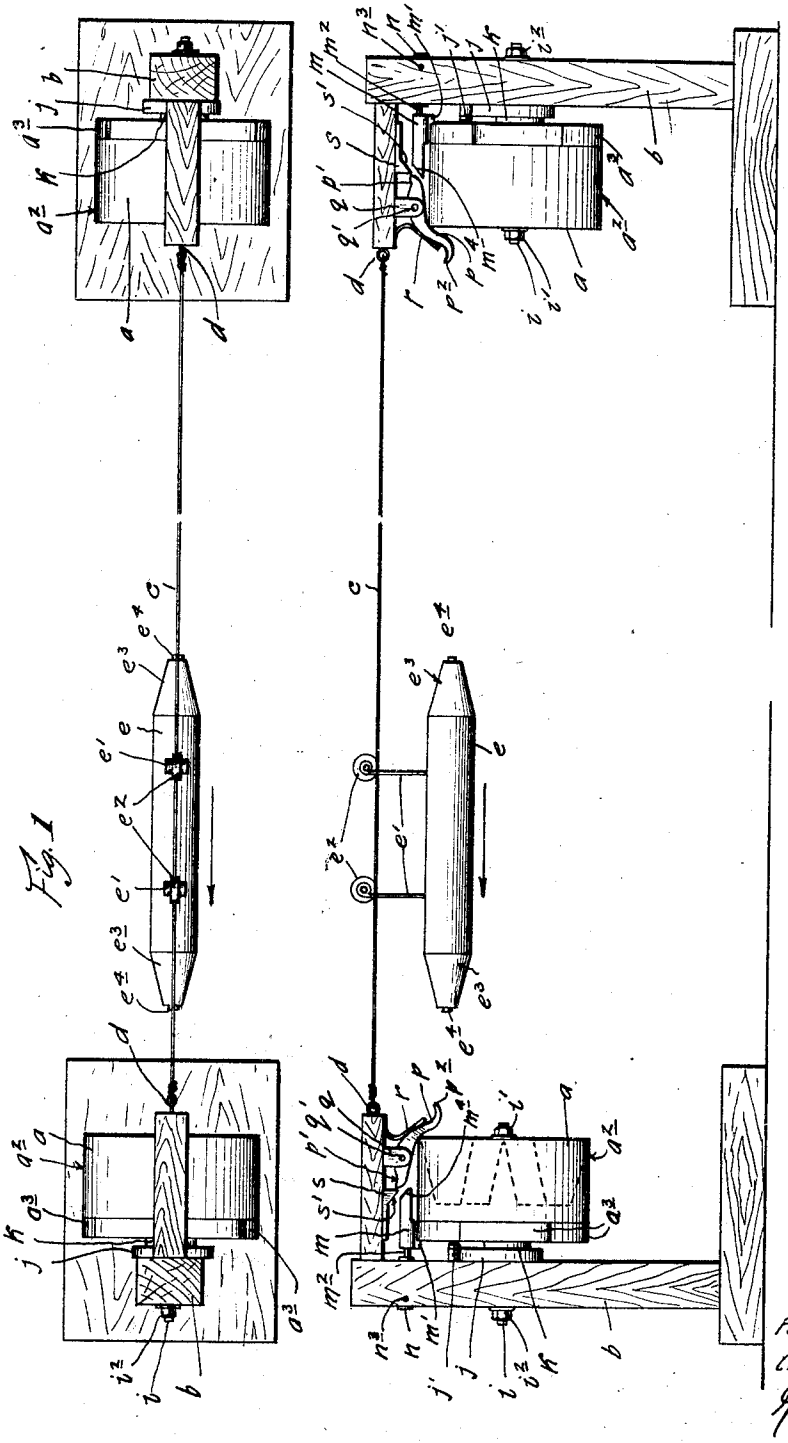


Fig. 1



Fig. 2

Inventors
Fayette L. Thompson
Charles A. Sloper
Gilbert Ramsey
Attorneys

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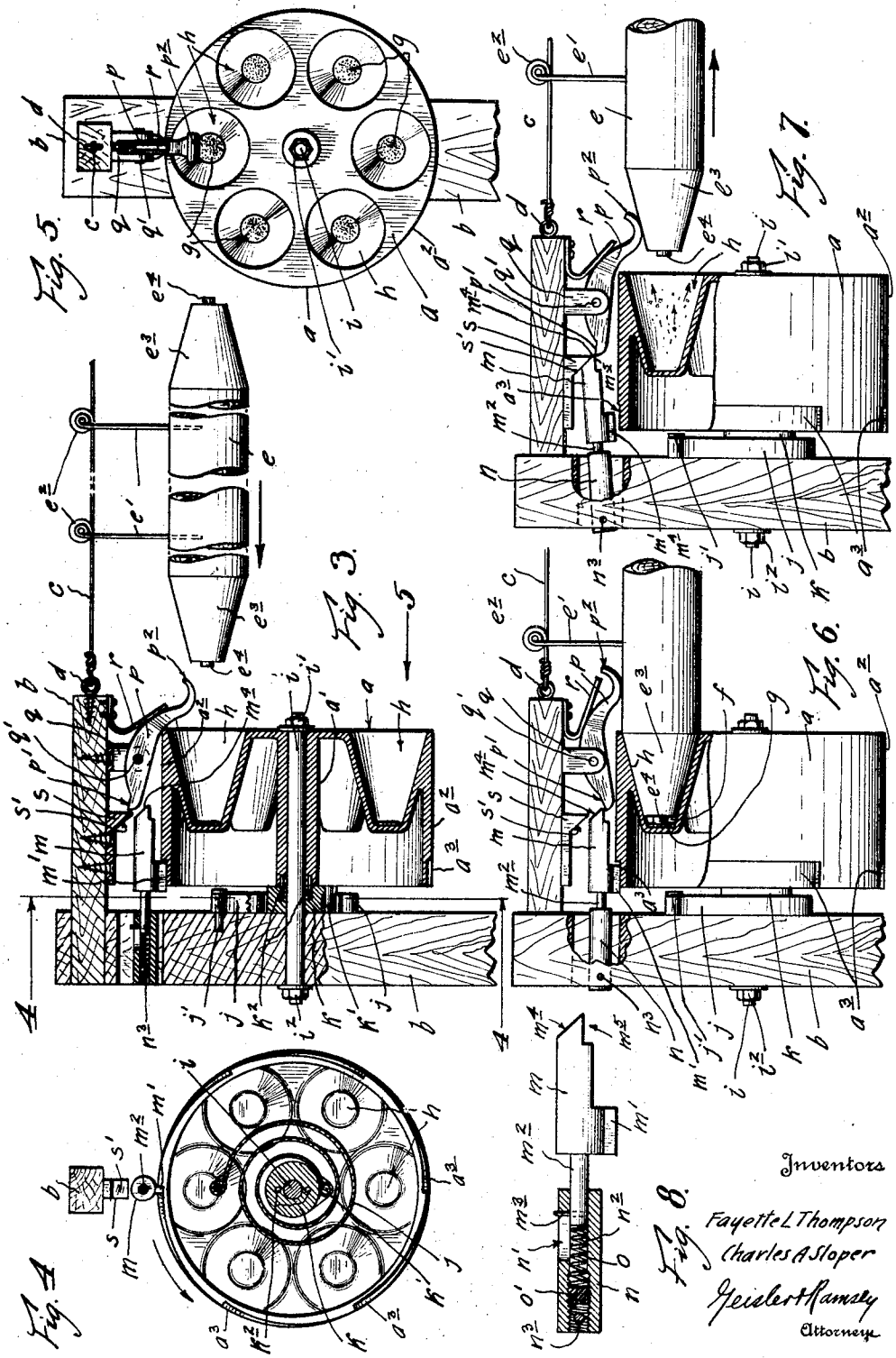


Fig. 1.

Fig. 3.

Fig. 4

Fig. 5.

Fig. 6.

Fig. 8.

Inventors

Fayette L Thompson

Charles A Sloper

Geisler & Ramsey

Attorneys

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# UNITED STATES PATENT OFFICE.

FAYETTE L. THOMPSON, OF PORTLAND, AND CHARLES A. SLOPER, OF RAINIER, OREGON.

## TOY AND OPERATING MECHANISM THEREFOR.

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The principal object of our invention is to provide an amusing toy comprising two stations and a body shunted back and forth between them, to simulate the shooting of projectiles from and towards opposite points. To make the effect more realistic, a percussion cap or fulminate is used as the agency for generating a force by which said body is projected. The stations are preferably arranged so that said body will be shunted back and forth a number of times.

We attain our object in the combination of a body and means for guiding said body along a predetermined path, having abutments at each end arranged to be struck by said body. Means are provided for placing a fulminate between said abutment and said body to be exploded by the impact of the body with the abutment. Either said abutment or the striking end of said body is provided with a cavity which constitutes a firing chamber for said fulminate and thus the force generated by the explosion functions to fill said firing chamber and to project said body from said abutment.

To provide means for shunting said body back and forth between two stations carrying said abutments more than once, we provide a plurality of fulminate elements and means to bring the latter successively into position to be exploded by the impact of the body with the abutment.

The details of construction and the mode of operation of our device are hereinafter described with reference to the accompanying drawings, in which:

Fig. 1 is a plan view of our improved toy showing the two actuating heads and the body to be reciprocated;

Fig. 2 is an elevation thereof;

Fig. 3 is an enlarged sectional view thru one of said heads showing the actuating mechanism thereof;

Fig. 4 is a section taken on the line 4—4 of Fig. 3 showing the spring for rotating said head;

Fig. 5 is an elevation of said head taken in the direction of the arrow 5 in Fig. 3;

Fig. 6 is an elevation of the parts shown in Fig. 3, a portion being shown broken away to disclose the body to be reciprocated seated in one aperture of said head;

Fig. 7 is a similar view showing a body as having been driven by said aperture by the explosion of the fulminate, said Figs. 3, 6, and 7 illustrating the progressive action of said devices; and

Fig. 8 is an enlarged detailed view of the holding pawl for each of said heads.

Our improved toy comprises two heads $a$ spaced apart and carried by supports $b$. Extending between said heads is a taut, horizontally disposed guiding cable $c$, the ends of said cable being fastened to eyes $d$, screwed into said supports $b$. A body $e$ to be reciprocated is carried by said cable $c$, supported by two arms $e'$. Said arms preferably carry trolley wheels $e^2$ to eliminate friction with said cable-way. Said body $e$ is preferably cylindrical and has tapered ends $e^3$ and at the extremities of said body, firing pins $e^4$ are mounted, said firing pins extending a substantial distance from said extremity so as to provide a firing chamber, as $f$ in Fig. 6, when said firing pin strikes the explosive cap or fulminate $g$ in each of the cavities $h$ in said body.

Each of said heads $a$ are rotatably mounted upon a stub-shaft $i$ extending laterally from said support $b$, and a plurality of said cavities $h$ are arranged concentrically about said stub-shaft. A spirally wound spring $j$ connects the head to said support $b$ and constitutes a motor for rotating said head. Said spring $j$ is fastened at one end to a pin $j'$ driven into said support $2^b$ and at the other end a rotatable disc $k$, thru a pin $k'$ carried thereby. Said disc is releasably connected to said head $a$ by two pins $k^2$, said pins resembling dowels as shown in Fig. 3.

Said head is preferably made with a stem $a'$ extending the entire length of said head, thus constituting a firm bearing for the latter upon said stub-shaft $i$. A nut and washer $i'$ and $i^2$ upon said stub-shaft hold said head against displacement from said stub-shaft. Said head is preferably made with relatively thin walls and resembling a cup, as shown in Fig. 3, to eliminate a substantial portion of the mass thereof, thus arranged, said head will respond more quickly to the action of the spring $j$ than if said head had greater mass.

Formed upon the rim $a^2$ of said cup-like heads is a circular ratchet $a^3$, as shown in Fig. 4, and said ratchet is engaged by a pawl $m$ carried by a trunnioned sleeve $n$, pivotally mounted in said support $b$. The engaging lip $m'$ for said pawl extends laterally there-

from and extending longitudinally from said pawl is a stem $m^2$ which slidably engages the bore of said sleeve $n$. A pin $m^3$ extends laterally from said stem $m^2$ and engages a longitudinal slot $n'$ in said sleeve. Coiled within the bore $n^2$ of said sleeve is a compression spring $o$ which tends normally to hold said pawl $m$ in the position shown in Fig. 8, said spring bearing against a threaded plug $o'$ at one end, and the stem $m^2$ for said pawl at the other.

The end $m^4$ of said pawl is beveled and under said beveled end, said pawl is undercut, as at $m^5$. A trigger $p$ is pivotally mounted upon an arm $q$ carried by said support $b$ and one end $p'$ of said trigger is adapted to engage the end $m^4$ or the undercut portion $m^5$ of said pawl $m$. The other end $p^2$ of said trigger is curved and is arranged in the path of said body $e$ and is adapted to be rocked counter-clockwise, as viewed in Fig. 3, by engagement with the tapered end $e^3$ of said body. Said trigger, however, is normally held by a spring $r$ against a rim $a^2$ of the head $a$, as is shown in Fig. 3.

In this position its end $p'$ is out of engagement with the end $m^4$ of the pawl and the lip $m'$ of said pawl engages one of the teeth of the ratchet in the manner shown in Figs. 3 and 4.

When said body $e$ strikes the end $p^2$ of said trigger $p$, it rocks said trigger counter-clockwise, when the end $p^2$ climbs the tapered head $e^3$ of said body, as said body moves towards said head and enters the cavity $h$ in alinement with the guide cable $c$. The rotation of said trigger $p$ about its pivot $q'$ first causes the end $p'$ of said trigger to ride down the beveled face $m^4$ of said pawl and to force said pawl towards the left, as viewed in Fig. 3, compressing the spring $o$ in said sleeve $n$. When said end $p'$ passes beyond said beveled end $m^4$ said end $p'$ of the trigger engages the under-cut portion $m^5$ of said pawl, as shown in Fig. 6.

The firing pin $e^4$ strikes the explosive cap or fulminate $g$ in the cavity, as shown in Fig. 6, and the explosion thereof by the impact of the latter fills the firing chamber $f$ with gas and drives the body out of said cavity and down said cable towards the opposite head.

When said body moves out of said cavity and its tapered head $e^3$ moves out from the cavity the trigger $p$ is rocked clockwise, as viewed in said figures, by the spring $r$. The end $p'$ of said trigger engaging the undercut portion $m^5$ of the pawl $m$ thus lifts the pawl, rocking the latter and its sleeve upon the trunnion $n^3$.

Vertically alined above the end $m^4$ of the pawl is a tapered stop $s$ which has an inclined face $s'$ adapted to engage said end. Thus when said pawl is moved upwardly by the trigger said inclined face $s'$ engages the beveled face $m^4$ of said pawl and moves the latter out of engagement with the end $p'$ of said trigger. The pawl is then free to fall.

When said pawl is lifted upwardly by said trigger its lip $m'$ moves out of engagement with the circular rack $a^3$ and permits the coiled spiral spring $j$ to rotate the head $a$. Said trigger, pawl, and stop are arranged so that said pawl is released quickly and thus falls into engagement with said rack before the next succeeding tooth passes thereunder. Thus the actuation of the trigger permits said head to be rotated under the action of said spring a distance equal to the spacing between said cavities $h$. The latter are moved successively into position under the guiding cable $c$. Said body $e$ therefore, is reciprocated alternately between the heads at the opposite ends of said cable $c$ successively a number of times equaling the number of fulminates or driving means carried by said heads.

We claim:

1. The combination of a body, a means by which said body is movably guided along a predetermined path, an abutment at one end of said path for impact by said body, one of said impacting elements being provided with a cavity in which the other fits and into which it is guided by said guiding means, and means for placing a fulminate between said abutment and said body, to be exploded by the impact of the body with the abutment, whereby the force generated by said explosion functions to project said body from said abutment.

2. The combination of a body, a means by which said body is movably guided along a predetermined path, an abutment at one end of said path for impact by said body one of said impacting elements being provided with a cavity in which the other fits and into which it is guided by said guiding means and means for supporting a plurality of fulminate elements between said body and said abutment, means operating to bring the fulminates successively into position to be exploded in one of said cavities by the impact of the body with the abutment, thus to generate a force functioning to project the body from such abutment, said means for bringing the fulminates successively into position including actuating devices operated by contact of said body therewith.

3. The combination of a body, a means by which said body is movably guided along a predetermined path, an abutment at one end of said path, said abutment including a movable member provided with a plurality of cavities, means for alining one of said cavities with said path, said means including devices actuated by contact therewith of said body and operating to move said

movable member and thus aline said cavities successively with said path, and means for supporting a fulminate between said abutment and the body, in the cavities of the abutment, to be exploded by impact of the body with the abutment, whereby the force generated by said explosion functions to propel said body from the abutment.

4. The combination of a body, a means by which said body is movably guided along a predetermined path, an abutment at one end of said path, said abutment including a rotary disk provided with a plurality of concentrically arranged cavities, means for alining one of said cavities with said path, said means including devices actuated by contact therewith of said body and operating to rotate said disk and thus aline said cavities successively with said path and means for supporting a fulminate between said abutment and the body, in the cavities of the abutment, to be exploded by impact of the body with the abutment, whereby the force generated by said explosion functions to propel said body from the abutment.

5. The combination of a body, a means by which said body is movably guided along a predetermined path, an abutment at each end of said path, said abutments including a movable member provided with a plurality of cavities, means for alining one of said cavities with said path, said means including devices actuated by contact therewith of said body and operating to move said movable member and thus aline said cavities successively with said path and the means for supporting a fulminate between said abutment and the body, in the cavities of the abutment, to be exploded by impact of the body with the abutment, whereby the force generated by said explosion functions to propel said body from the abutment.

6. The combination of a body, a means by which said body is movably guided along a predetermined path, an abutment at one end of said path, said abutment including a movable member provided with a plurality of cavities and means for alining one of said cavities with said path, said means including devices actuated by contact therewith of said body and operating to move said movable member and thus aline said cavities successively with said path.

7. The combination of a body, a means by which said body is movably guided along a predetermined path, an abutment at one end of said path, one of said impacting elements including a movable member provided with a plurality of cavities and means for alining one of said cavities with said path, said means including devices actuated by contact therewith of said body and operating to move said movable member and thus aline said cavities successively with said path.

8. A toy of the character described, comprising two movable companion heads having a plurality of cavities formed in their opposed faces, a body adapted to seat in one of said cavities and a guideway for said body extending between said two heads, actuating means in each of said cavities for driving said body therefrom, and means for moving said heads so that their cavities are progressively moved into alinement with said guideway.

9. A toy of the character described, comprising two movable companion heads having a plurality of cavities formed in their opposed faces, a body adapted to seat in one of said cavities and a guideway for said body extending between said two heads, actuating means in each of said cavities for driving said body therefrom, and spring actuated means for moving said heads so that their cavities are progressively moved into alinement with said guideway.

10. A toy of the character described, comprising two rotatable companion heads having a plurality of cavities formed in their opposed faces, a body adapted to seat in one of said cavities and a guideway for said body extending between said two heads, actuating means in each of said cavities for driving said body therefrom and spring actuated means for moving said heads so that their cavities are progressively moved into alinement with said guideway.

11. A toy of the character described, comprising two movable companion heads having a plurality of cavities formed in their opposed faces, a body adapted to seat in one of said cavities and a guideway for said body extending between said two heads, actuating means in each of said cavities for driving said body therefrom, means for moving said heads so that their cavities are progressively moved into alinement with said guideway, and said means comprising a spring motor for each of said heads and a pawl therefor.

12. A toy of the character described, comprising two movable companion heads having a plurality of cavities formed in their opposed faces, a body adapted to seat in one of said cavities and a guideway for said body extending between said two heads, actuating means, in each of said cavities for driving said body therefrom, means for moving said heads so that their cavities are progressively moved into alinement with said guideway, said means comprising a spring motor for each of said heads and a trigger controlled pawl therefor and said trigger being arranged in path of said body and to be actuated by the latter.

13. A toy of the character described, comprising two movable companion heads having a plurality of cavities formed in their opposed faces, a body adapted to seat in one of said cavities and a guideway for said

body extending between said two heads, a percussion cap in each of said cavities for driving said body therefrom and means for moving said heads so that their cavities are progressively moved into alinement with said guideway.

14. A toy of the character described, comprising two rotatable companion heads having a plurality of cavities formed in their opposed faces, a body adapted to seat in one of said cavities and a guideway for said body extending between said two heads, a percussion cap in each of said cavities for driving said body therefrom, and means for moving said heads so that their cavities are progressively moved into alinement with said guideway.

15. A toy of the character described, comprising two movable companion heads having a plurality of cavities formed in their opposed faces, a body adapted to seat in one of said cavities and a guideway for said body extending between said two heads, a percussion cap in each of said cavities for driving said body therefrom, means for moving said heads so that their cavities are progressively moved into alinement with said guideway and a firing pin carried by each end of said body, spaced therefrom, arranged to strike the bottom of said cavity in advance of said body thereby to maintain a firing chamber within said cavity and behind said body.

FAYETTE L. THOMPSON.
CHARLES A. SLOPER.