Nov. 25, 1941. L. F. WAPER 2,263,662

MECHANICAL MOTION

Filed March 20, 1941 2 Sheets-Sheet 1

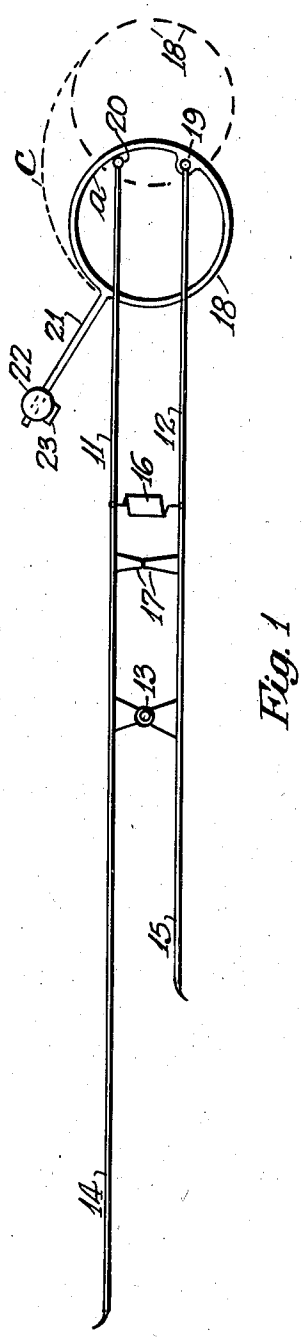


Fig. 1

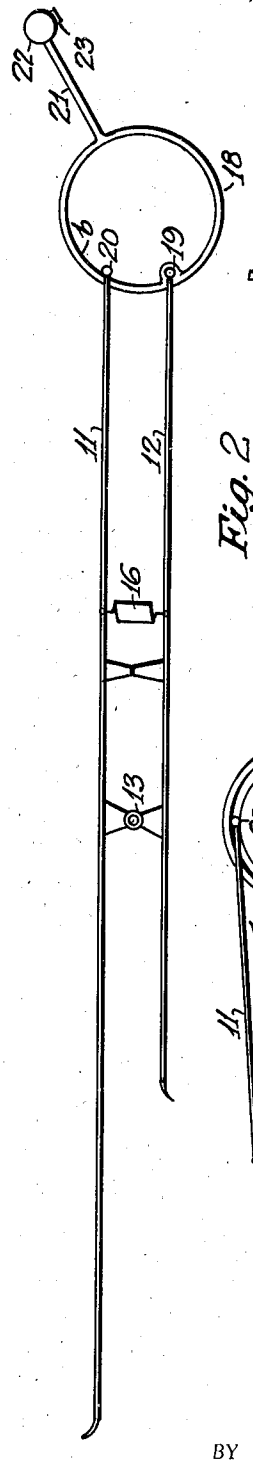


Fig. 2

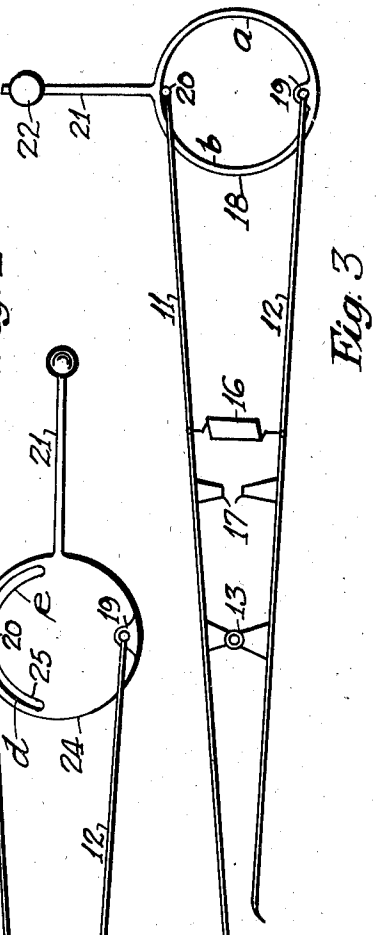


Fig. 3

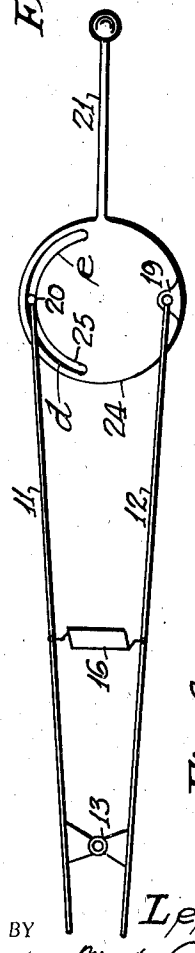


Fig. 4

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MECHANICAL MOTION

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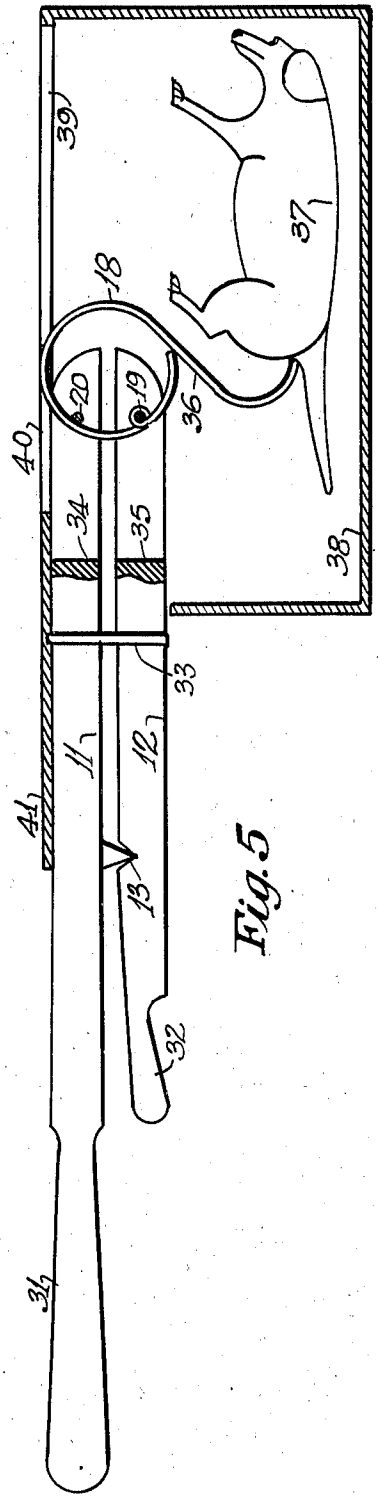


Fig. 5

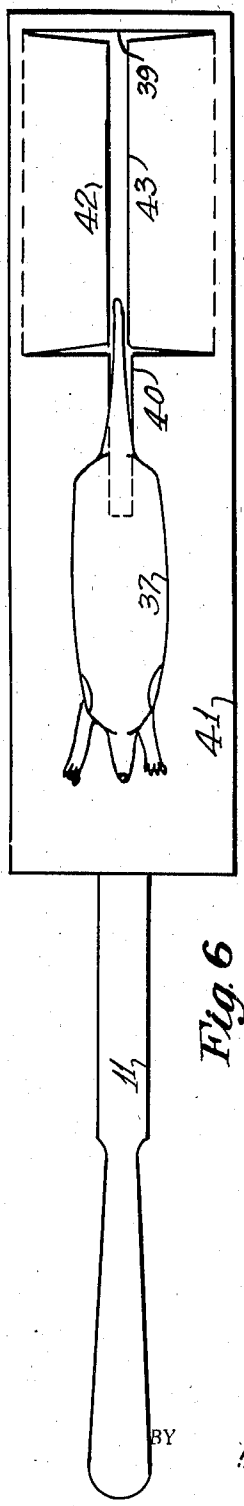


Fig. 6

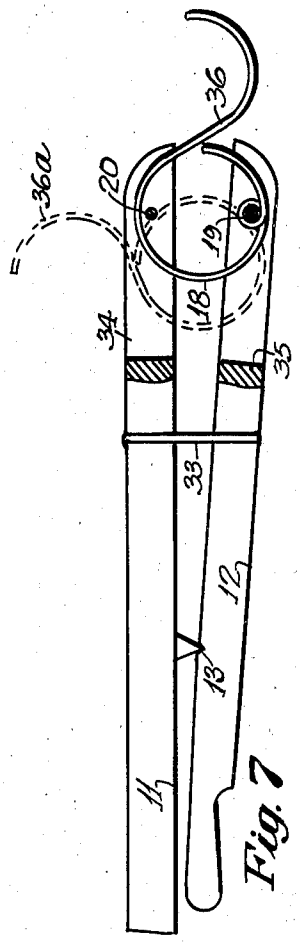


Fig. 7

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UNITED STATES PATENT OFFICE

2,263,662

MECHANICAL MOTION

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Application March 20, 1941, Serial No. 384,367

6 Claims. (Cl. 74—96)

This invention relates to a mechanical motion for converting a stepping motion or a backward and forward motion into an oscillatory motion and is of general use in the mechanical arts, one application of the invention is shown in connection with a disappearing toy.

An object of the invention is to provide for the oscillation of a ring which is pivotally supported on its periphery and which is engaged by a stud to cause its oscillation by varying the distance between the stud and the pivotal support. Another object of the invention is to provide for the oscillation of a ring operated by a backward and forward movement of a pair of levers; another object of the invention is to provide an impulse for moving a ring in one direction and a second impulse for moving it in the reverse direction, said impulses being obtained by a stepping action of a pair of levers.

Other objects of the invention will be more particularly understood from the following specification and the accompanying drawings, in which—

Fig. 1 is a developed plan of the mechanical motion in one position;

Fig. 2 is a developed plan of the mechanical motion in the reverse position to Fig. 1;

Fig. 3 is a developed plan of the mechanical motion in the central position;

Fig. 4 is a developed plan of a modified application of the mechanical motion providing a driving impulse by the operation of the levers in both directions;

Fig. 5 is a side elevation of a disappearing toy with the box or container of the toy sectioned;

Fig. 6 is a top plan view of the device in Fig. 5 with the disappearing object exposed, and

Fig. 7 is a detail showing the operating mechanism used in Figs. 5 and 6.

This invention comprises a ring or its equivalent pivotally mounted on its periphery so that it may oscillate on this pivot. Inside the ring a stud or equivalent is provided to engage the inner perimeter of the ring. The stud and the pivot are movable relative to each other so that as the stud is moved away from the pivot a distance corresponding to the diameter of the ring, the ring is rotated until this position is reached by the engagement of the stud with the ring. At this point, if the stud is brought closer to the pivot the ring is freed and can move to a position where it is stopped by the stud again engaging the ring.

The ring may be provided with some form of translating device or indicator which provides momentum to the ring so that when the stud is moved from the inner to the outer position it engages the perimeter of the ring, causing it to rotate to the position where the stud is separated from the pivot a distance corresponding to the diameter of the ring. At this point if the stud is again returned to the starting position, the momentum carries the ring forward in its rotational movement until stopped by the stud in its inner position. If, when in this position, the stud is again moved away from the pivot the ring is rotated in the reverse direction and by restoring the stud at the proper time the momentum completes the movement of the ring, that is, a complete oscillating cycle.

The ring thus oscillates back and forth in response to the outward and inward movement of the stud relative to the pivot. A convenient way of securing this movement is by a pair of levers, one of which forms a handle and is connected to the stud and the other forms a finger grip, is pivoted to the first lever and supports the pivot of the ring. By moving the levers towards and away from each other in a step action the ring is oscillated once in each direction for each step, that is, each cycle of movement of the levers moves the ring to a new position, where it remains until again moved by another cycle of movement of the levers.

An application of the invention is shown in connection with a disappearing toy which disappears into a box and is operated by a ring controlled by the levers so that for each operation the figure is moved out of the box to be moved back again by the next operation of the levers.

In the drawings, 11 is the lever comprising the handle 14 which supports the stud 20 and 12 is the complementary lever pivoted to 11 at 13 and operated by a finger grip at 15. The lever 12 supports the pivot 19 of the ring 18 and by spring 16 and stops 17 assumes a normal position relative to the lever 12 which brings the pivot 19 and the stud 20 relatively close together within the ring 18. When the finger grip 15 is moved towards 14, the stud 20 is moved away from the pivot 19 and rides along the inner surface *a* of the ring 18, causing the ring to move on the pivot 19 along the arc indicated by *c* to the position 18′ where it is stopped by the opposite side of the ring engaging the stud 20. The ring is provided with an arm 21, carrying an indicating device 22 which corresponds with the object to be oscillated. 22 may be freely rotated on 21 and weighted at 23 so that when the ring 18 moves to the position shown in Fig. 2 the indicating

device 22 is rotated by the weight 23. It will be observed from Fig. 2 that the reverse movement corresponds to the movement in Fig. 1 except that the stud 20 engages the opposite side of ring 18 at *b* to rotate it in the opposite direction.

The operation will be understood from Fig. 3 showing the stud 20 moved away from the pivot 19 by deflecting the levers a distance corresponding to the diameter of the ring in which the arm 21 is in the vertical position. If the levers are held in this position, the device is locked and the arm 21 remains vertical, but if upon reaching this position the levers are returned to the normal position with the stop members 17 in engagement, the ring continues the movement of the initial impulse as far as the stud 20 will permit.

In Fig. 4 the arrangement is modified to use a disc 24 instead of the ring 18. This disc is provided with an arcuate slot 25 located about the center which engages the stud 20. When the stud 20 engages the outer portion of the slot *d* the first impulse is transmitted to the arm 21 and, after passing the center, the stud then engages the inner surface *e* of the slot as it is moved by spring 16, thereby driving the arm for a full stroke in both directions without lost motion.

It should be understood that the ring and the stud engaging the ring are shown in diagrammatic form and would have to be constructed in a manner best suited for the work intended. Further, the ring may be made in the form of a cam to vary the impulse transmitted thereto.

In Fig. 5 the lever 11 terminates in the handle 31 and the lever 12 terminates in the finger grip 32, the rubber band 33 holds these levers in the closed position. A vertical slot is provided in lever 11 at 34 and a corresponding slot 35 is provided in lever 12 for the free vertical movement of the wire ring 18. This ring is provided with an extension 36 secured to the figure 37 located in the housing 38 and arranged so that it may pass through the aperture 39 which is normally closed by the flaps 42 and 43. A table is provided at 41 with a slot at 40 for the movement of member 36. When the figure is moved out of the box by the operation of 32, it rests on the table 41 as indicated in Fig. 6. The next movement of lever 32 oscillates the ring 18 and moves the figure 37 back into the box through the flaps 42 and 43. The position of the ring 18 and the extension 36 is indicated at 36*a*, Fig. 7, when the figure is on table 41.

This mechanism is simple, low in cost and very effective for operating toys or for utility purposes.

Having thus described my invention, I claim:

1. A mechanical motion comprising a ring having a pivotal support on its periphery and a stud engaging the interior of the ring to move it on its pivotal support, and means for moving said stud relative to said pivot support for a cycle of movement to move said ring in one direction only and the next cycle of movement of said stud moving said ring in the opposite direction only.

2. A mechanical motion comprising a disc having a pivotal support on its periphery, and an arcuate slot formed about its center, a stud engaging said slot without lost motion and means for moving said stud towards and away from the pivotal support of said disc to move said disc in one direction.

3. A mechanical motion for converting a stepping motion into an oscillating motion comprising a ring having a pivotal support on its periphery, a first lever carrying said pivot, a stud engaging the interior of said ring, a second lever supporting said stud, pivotal means connecting said levers whereby movement of said levers on their pivotal connection moves said stud relative to the pivotal support of said ring to oscillate the ring.

4. A mechanical motion for converting stepping motion into oscillating motion comprising a ring having a pivotal support on its periphery, a first lever carrying said pivot, a stud engaging the interior of the ring, a second lever supporting said stud, means for operating said levers to vary the spacing of said stud relative to said pivot support to oscillate said ring and translating means operated by said ring.

5. A mechanical motion for converting stepping motion into oscillating motion comprising a disc having a pivotal support on its periphery, a first lever carrying said pivot, said disc having an arcuate slot, a stud engaging the slot of the disc, a second lever supporting said stud, pivotal means connecting said levers, a spring for restoring said levers to a normal position, the movement of said levers on their pivotal connection to increase the distance between said stud and the pivotal support of the disc, moving said disc for a partial rotation and the movement of said levers to their normal position by said spring continuing the partial rotation of said disc.

6. A mechanical motion for converting stepping motion into oscillating motion, comprising a ring having a pivotal support on its periphery, a stud engaging the inside of said ring, a pair of adjacent levers each having a slot at the end, said slots being in alignment to receive said ring, one of said levers supporting said pivot and the other supporting said stud and means for moving said levers to vary the distance separating said pivot and said stud to oscillate said ring in accordance with the movement of said levers.

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