July 23, 1963 R. ELLIS 3,098,319

ANIMATED FIGURINE AND MEANS FOR OPERATING SAME

Filed July 10, 1961 3 Sheets-Sheet 1

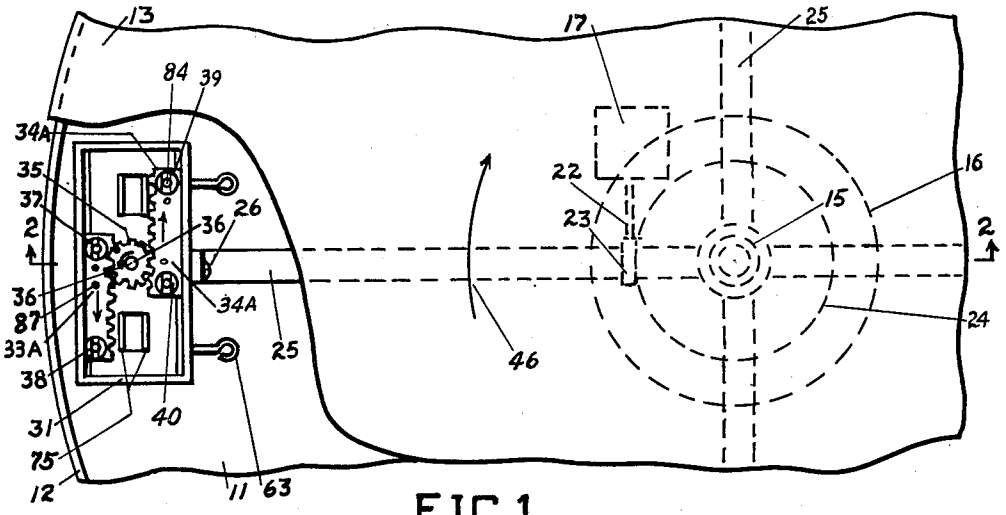


FIG. 1.

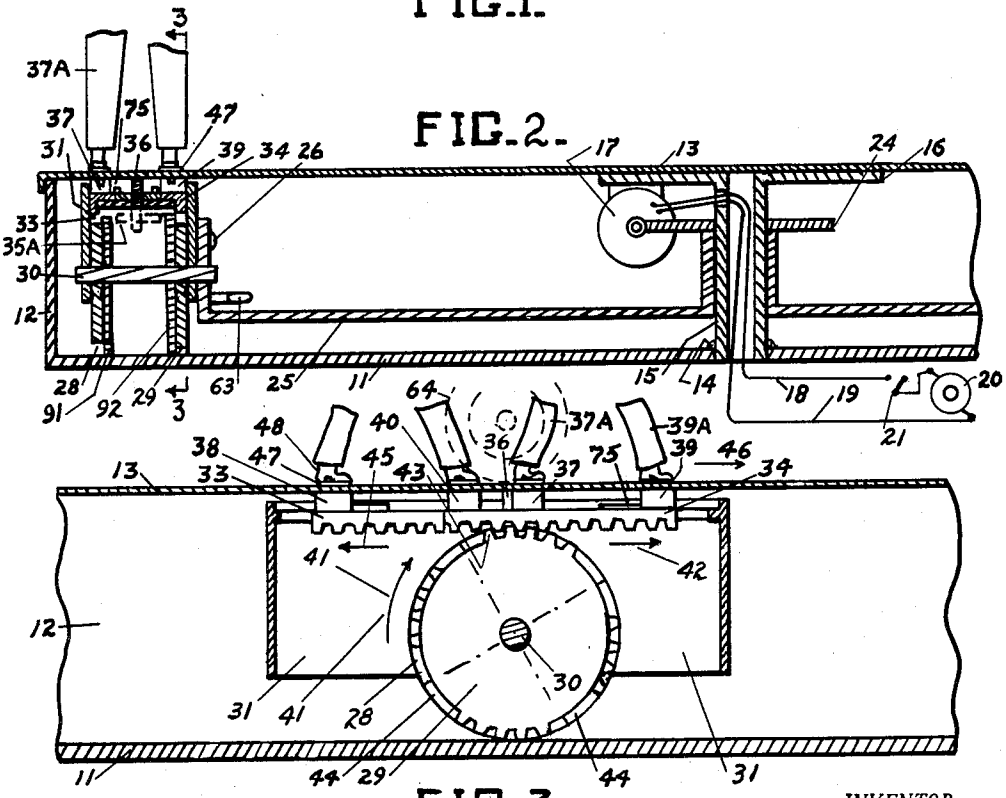


FIG. 2.

FIG. 3.

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ANIMATED FIGURINE AND MEANS FOR OPERATING SAME

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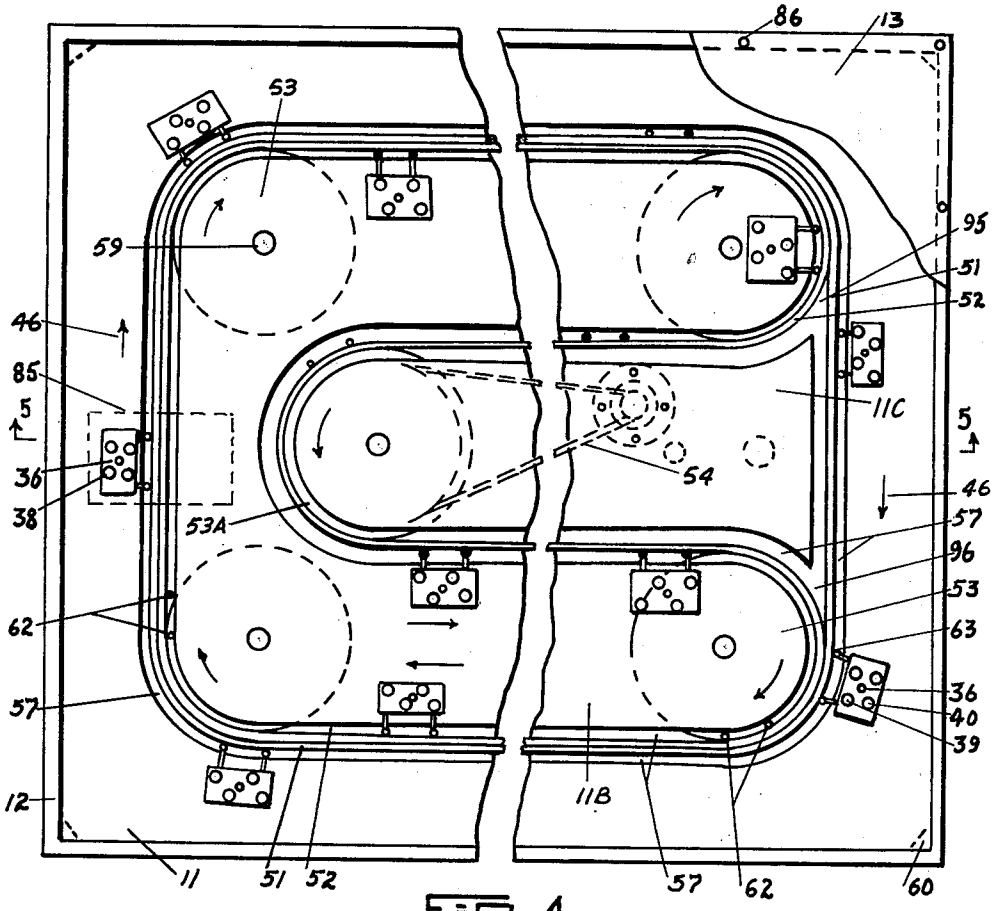


Fig. 4.

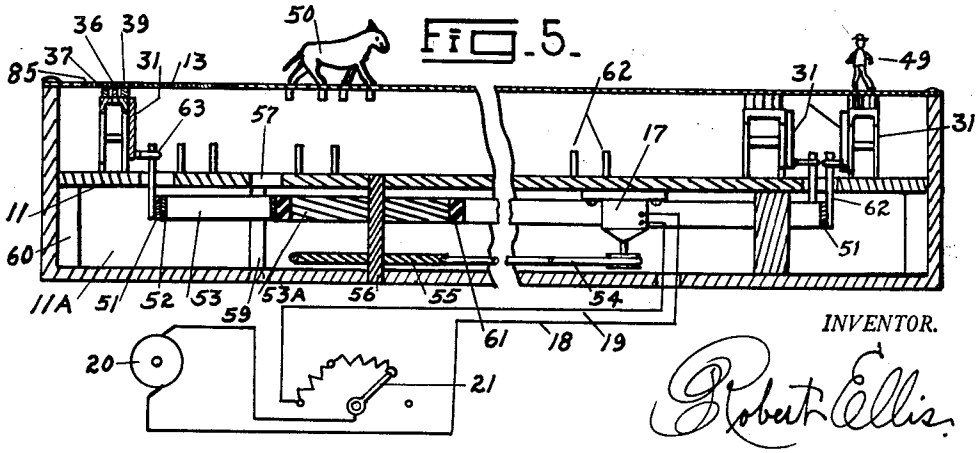


Fig. 5.

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ANIMATED FIGURINE AND MEANS FOR OPERATING SAME

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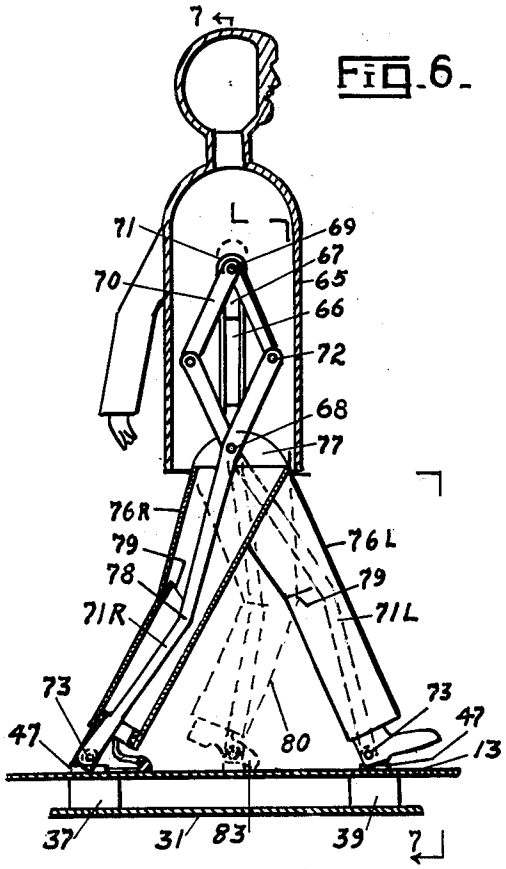


Fig. 6.

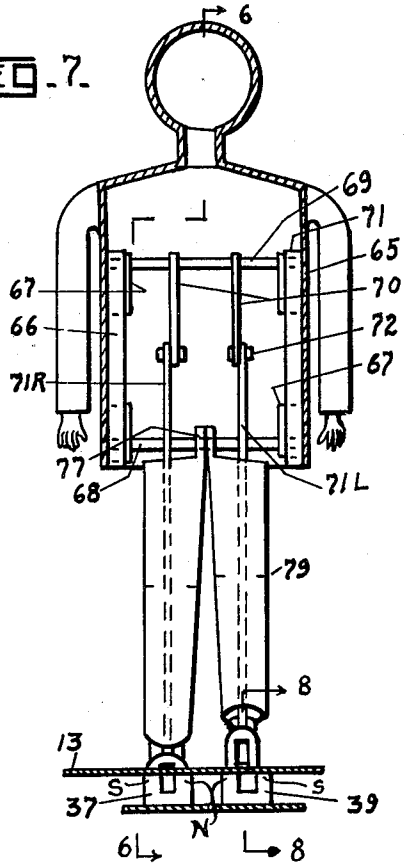


Fig. 7.

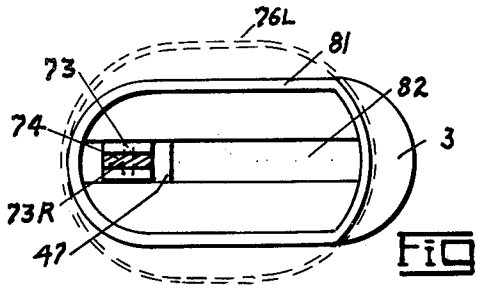


Fig. 9.

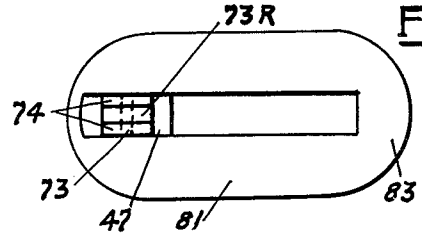


Fig. 10.

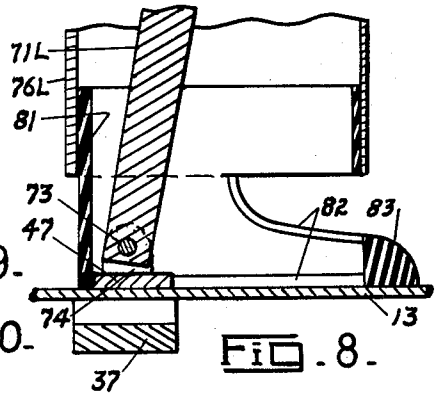


Fig. 8.

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United States Patent Office 3,098,319 Patented July 23, 1963

3,098,319

ANIMATED FIGURINE AND MEANS FOR OPERATING SAME

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Filed July 10, 1961, Ser. No. 123,391
11 Claims. (Cl. 46—240)

This invention relates to animated figurines and means for operating same and the principal object of the invention is the provision of a figurine together with the operating means therefor which will cause the figurine to "walk" over a smooth plane surface devoid of any mechanical connection whatever between the walking figurine and the surface so that the natural act of walking is perfectly simulated.

Another object of the invention is the provision of means whereby the operating mechanism for said figurine may cause the figurine to traverse in a circuitous, elliptical or compound pathway.

Another object of the invention is to provide an improvement over my prior Patent #2,942,378, issued June 28, 1960 on Walking Figurine, wherein, while a similar mechanism is shown for "walking" a two-legged figurine in upright position and each leg is alternately projected forward by partly visible mechanical means through a slot in the walking surface, herein I use invisible magnetic attractive means for alternately projecting each foot forward, the magnetic attractive means being supplied from underneath the non-magnetic walking surface.

Another object of the invention is the provision of means for providing a reciprocating movement from a single steadily forward moving belt or rotary structure underneath the walking surface which reciprocating movement is translated into a step-by-step forward motion applied to the feet by magnetic attraction of a figurine "walking" over a plane unobstructed surface.

Still another object of the invention is the provision of a reciprocating means as above described which is attachable to either a rotary moving mechanism or to a belt travelling in a substantially elliptical or compound course beneath the plane walking surface of the figurine, which reciprocating means is supplied with permanent magnets adapted to attract an armature attached to the foot of the figurine through the thin walkway.

And still another object of the invention is the provision of a device of this character in which the knee of the figurine is adapted to bend slightly at the center of each forward leg movement as in natural walking.

And another object of the invention is the provision of a small transparent section in the plane walking surface whereby an operator may accurately and conveniently place a figurine over the reciprocating mechanism while same is in motion.

Other and further objects will appear in the specifications and be specifically pointed out in the appended claims, reference being had to the accompanying drawings exemplifying the invention in which;

FIG. 1 is a partial top view of a rotary moving device showing the reciprocating mechanism.

FIG. 2 is a vertical section of FIG. 1 on the line 2—2 thereof.

FIG. 3 is an enlarged view of the reciprocating mechanism on the line 3—3 of FIG. 2.

FIG. 4 is a top view of a belt driven means for applying motion to the reciprocating mechanism.

FIG. 5 is a vertical section on the line 5—5 of FIG. 4.

FIG. 6 is a vertical section of a two-legged figurine taken on the line 6—6 of FIG. 7.

FIG. 7 is a vertical section on line 7—7 of FIG. 6.

FIG. 8 is an enlarged section of the foot of a two-legged figurine taken on the line 8—8 of FIG. 7.

FIG. 9 is a top view of the shoe shown in FIG. 8.

FIG. 10 is a bottom view of FIG. 9.

Referring to the drawings in which like characters and figures of reference refer to similar parts throughout the several views, the numeral 11 denotes the floor of a circular or other shaped box the upstanding sides 12 of which are topped by a thin non-magentic plane surfaced opaque cover 13 smooth on both sides. In the center of the box shown in FIGS. 1 and 2 is secured as by gluing at 14 the tubular stanchion 15 whose upper flange 16 not only supports the center of the cover 13 but also the small electric motor 17 as better illustrated in FIG. 2. Insulated wires 18 and 19 run from the motor 17 through the hollow stanchion 15 to the source of some appropriate electric energy as at 20, the switch being at 21. To the end of motor shaft 22 is secured the worm 23 which slowly rotates the worm gear 24 which has the stanchion 15 as a bearing, the worm gear 24 having attached thereto the radially extending arms 25, the outer extremity of each arm being bent upwardly as illustrated and fastened by screw 26 to the rectangular frame 31 containing the reciprocating mechanism which is operated by the movement of the rotary moving arms 25, in the direction of arrow 46, causing the wheels 91 and 92, see FIG. 2, to roll over floor 11, these wheels being press-fitted to shaft 30 as well as the outer gear wheels 28 and 29 respectively, the said shaft 30 bearing through the side walls of the frame 31 as shown, all the wheels rotating as one. Each gear wheel 28 and 29 in this instance, is divided into four equal sectors, each two opposite sectors being geared, as better illustrated in FIG. 3, while the two intermediate sectors are slightly depressed and bare of gear teeth, as shown at 44. The gear teeth of wheel 29 are shown meshing with the teeth of gear rack 34, see FIG. 3, while the gear teeth of wheel 28 are out of mesh with its respective gear rack 33. Thus both racks 33 and 34 move in the direction of arrows 45 and 42 respectively due to the interconnecting pinion 35 rotating on short shaft 36 which shaft bears in the upper horizontal part of frame 31 as better illustrated in FIG. 1, the teeth of the pinion 35 meshing with the horizontally disposed portion of gear racks 33A and 34A. It will thus be apparent that a continuously reciprocating motion is derived from the act of the wheels 91 and 92 rolling over floor 11 and the speed and distance is substantially the same as that of the surface traversed over floor 11, in respect to the frame 31. It will be noted that, while the gear teeth of either wheel 28 or 29 mesh with its respective rack 33 or 34, the teeth of its opposite wheel are out of mesh thus imparting motion in a forward direction only in the direction of arrow 42 while the opposite rack reverses in the direction of arrow 45. The short shaft 36 extends up to the under side of cover 13 for reasons hereinafter described. Permanent magnets 37, 38, 39 and 40 are attached to the upper face of racks 33A and 34A as shown in FIG. 1, the upper face of each magnet being in loose frictional contact with the under side of cover 13 as better illustrated in FIGS. 2 and 3. As the gear wheel 29 rotates further in the direction of arrow 42, the last tooth 43 in that particular gear sector will disengage with the last tooth on gear rack 34 and at the same instant the teeth on gear wheel 28 will commence to mesh with the teeth on rack 33 thus causing the rack 33 to move in the direction of arrow 42 and rack 34 in the direction of arrow 45 and so on thus creating a reciprocation motion as previously described. If desired, the pinion 35A, see dotted lines in FIG. 2, may extend downward further as illustrated and instead of its teeth meshing with the racks 33 and 34, they may mesh directly with the teeth on gear wheels 28 and 29. The permanent magnets 37, 38, 39 and 40 will react on the under side of cover 13 to attract the

armatures 47 attached to the underside of each foot 48 of the figurines above the cover 13 to simulate the exact act of walking. With the frame 31 moving steadily in the direction of arrow 46, the forwardly moving leg 39A of each figurine is taking a step twice the speed and distance relative to floor 11, the forward motion of rack 34A plus the equivalent forward motion of frame 31; while the leg 37A is standing still relative to floor 11, the forward motion of frame 31 minus the equivalent rearward motion of rack 33A. As forward leg 39A, see FIG. 3, originally started a step behind leg 37A, it will be apparent that a natural walking simulation is obtained by the reciprocating mechanism regardless whether or not magnetic or mechanical means are used to impart motion to the legs of a figurine. The armature 47 preferably consists of a thin sheet of magnetizable material such as iron.

The two legged figurine 49 and the four legged figurine 50 together with the reciprocating mechanism hereinbefore described may equally well be used in conjunction with a plane floor superimposed over an elliptical or compound traverse such as illustrated in FIGS. 4 and 5 wherein one or more belts 51 and 52 pass around pulleys 53 distributed within box 11A according to the desire of the operator. As more fully illustrated in FIG. 5, the electric motor 17 and pulleys 53 are preferably housed beneath the floor 11 in the additional compartment 11A, a belt 54 from motor 17 driving the pulley 55 which is press fitted to shaft 56 to which shaft pulley 53A is also press fitted. In this case the floor 11 is provided with two cut-outs, 11B being a U-shaped cut-out while 11C is an I-shaped cut-out fitting into the trough of the U-shaped cut-out as illustrated, all of the cut-outs having narrow slots 57 therebetween beneath which the aforesaid belts 51 and 52 traverse over aforesaid pulleys 53. The I-shaped cut-out is supported by the strut 58 and shaft 56 while the U-shaped cut-out is supported by the shafts 59 of the several pulleys 53, the floor perimeter 11 being supported by the corner columns 60. Pulley 53A is provided with a soft rubber rim 61 so that tension on the belts 51 and 52 may be maintained. In FIGS. 4 and 5 two belts 51 and 52 are shown, the inner belt 52 passing over power pulley 53A from where it traverses over all the other pulleys 53 in the direction of the arrows making a complete endless loop while the outer belt 51 traverses only over pulleys 53 with the inner belt 52 in between the pulleys and belt 51, which produces traction thereto, both belts travelling at the same speed.

To the inner face of the belt 52 and to the face of the outer belt 51 are glued or spot welded, according to what material the belts are made of, the upstanding pins 62, each two pins spaced a predetermined distance apart which coincides with the distance between the spring wire loops 63 attached to one side of the frame 31. As only the pins 62 protrude upwardly through the slots 57, it becomes an easy and convenient matter for the operator to removably attach any frame 31 by merely slipping the loops 63 over the desired pins 62, on either belt, thus causing the frame to traverse with its respective belt. The fact that the pins 62 traverse over the soft rubber rim 61 of the pulleys 53 does not cause any interference but rather creates better traction therebetween. Also the outer belt 51 receives its traction by passing over the belt 52 as the latter passes over pulleys 53, the upstanding pins 62 thereon accommodating the frames 31 on its outer side while the pins attached to the inner belt 52 pass over the pulleys 53, which are underneath floor 11, all traverse being in the direction of the arrows. It will be noted that the figures attached, by magnetic attraction, to the frames 31 on the outer belt 51 will traverse one way only in a long elliptical course while the figurines attached to frames 31 on the inner belt 52 will traverse a course partly alongside of those on the outer belt and then swerve to travel in an opposite direction at 95 and then meet again at 96, producing more interesting observation. The short shaft 36 is also permanently magnetized and proceeds at a steady forward pace thus making it advantageous to magnetically attract wheeled vehicles, etc., as indicated by the dotted lines 64, see FIG. 3.

While the construction and operation of the two-legged figurine 49 is similar to the one illustrated in my prior Patent #2,942,376, yet the latter must necessarily lift its knee through mechanism extending through a slot in the plane walking surface whereas there is no slot in the non-magnetic surface 13 in my present device, thus requiring an entirely different means to accomplish this result. In FIGS. 6 and 7 is illustrated an arrangement for lifting the knee of the figurine in order to more accurately simulate actual walking by a person and consists of customary hollow body 65 having oppositely disposed interior slots 66 as shown extending vertically along the sides of the body 65 and within which slots slidable blocks 67 are free to slide being only limited to such vertical movement by being the bearing blocks for the lower horizontally disposed shaft 68 and a similar upper shaft 69, these shafts together with the upper links 70 and the lower links 71R and 71L forming a lazy-tong mechanism which tend to keep the two-legged figurine in an upright position while the lower ends of the links 71R and 71L are secured to the floor 13, as will be readily understood. The shaft 68 bears through the lower links 71R and 71L and into both lower slidable blocks 67 while the upper shaft 69 bears through links 70 and into both upper slidable blocks 67. The figurine body 65 rests unto the upper slidable blocks 67 on account of the closed upper semi-circular end 71 of the slots 66. Pins 72 pivotally connect links 70 to 71R and 71L, completing the lazy-tong mechanism. That part of the lazy-tong mechanism below shaft 68, which represent the legs of the figurine, are first bent forward to the knee and then rearward to the heel of the foot as illustrated in FIG. 6, the lower end of each leg being pivoted at 73 to the upstanding lugs 74 attached to armature plate 47. It will thus be apparent that, as the permanent magnets 37 and 39 for instance, above which the armature plates 47 may happen to be superimposed with the cover 13 inbetween, are reciprocated through rotation of the wheels 28 and 29 traversing over floor 11, will cause the lever legs 71R and 71L to reciprocate in unison and create the simulation of a two-legged creature in the act of walking. A four-legged creature 50 may also be similarly simulated by placing all four legs over magnets 37, 38, 39 and 40; or two two-legged creatures may be superimposed over the above mentioned four magnets thus creating the simulation of two persons walking in step; or additional magnets may be secured to the reciprocating members 33 and 34. Particular note is directed to the fact that, as the leg 71L for example, takes a forward step from its original stationary rear position, there is added to its distance and speed the forward motion of the constantly forward moving frame 31 with appurtenances while the leg 71R, while also moving forward with frame 31 is simultaneously moving rearward a corresponding distance, thus apparently standing still, which it actually does in respect to the walking surface cover 13. In this manner I have been enabled to simulate a walking creature by means of magnetic attraction on a perfectly plane surface without any slots therein or mechanical connections of any kind between the figurine and operating mechanism and incidentally preventing sudden starts and stops of the entire mechanism as shown in my prior Patent #2,942,378. The reciprocating mechanisms herein shown all operate individually thus counterbalancing each other and avoiding a jerky walking motion to the figurine. The reciprocating gear racks 33 and 34 slide longitudinally between the longitudinal sides of the frame 31 and the upturned lugs 75. The wire loops 63 enable the individual frames 31 to be quickly and conveniently attached or detached to any of the movable belts 51 or 52 through the medium of upstanding pins 62 as better illustrated in FIGS. 5 and 6.

The legs 71R and 71L are each enclosed with their respective pants 76R and 76L which simulate natural clothing of a person, these pants being preferably made of very thin opaque plastic sheeting and pivoted on the cross shaft 68 by means of their upturned lugs 77 thus enabling the pants legs to move along with the lever legs they enclose, the pant legs being normally held in straight forward position by the forwardly protruding knee portion 78 of the lever legs 71R and 71L and at the bottom by the lower end of the lever leg contacting the inner rear end of the pants leg as illustrated. The pant legs 76R and 76L are slitted laterally part way at 79 at the knee, the rear inner end of the pant leg extending upward slightly above the knee as better illustrated in FIG. 6, thus enabling the knee to bend when taking a forward step as shown by the dotted lines 80.

A shoe 81, preferably made of soft rubber, is glued to the inner front and rear of the bottom of each pant leg 76R and 76L as better illustrated in FIGS. 8, 9 and 10. This shoe is provided with a longitudinal slot 82 within which the lower end of each respective lever leg together with its attached armature 47 and lugs 74 are adapted to slide as will be hereinafter described. The toe 83 of the shoe 81 is at the end of slot 82 and confines the relative movement of the lever leg 76L to a predetermined extent. It will be noted that the co-operating permanent magnets 37 and 39 have their like poles N nearest each other when they pass during each reciprocation or step thereof, thus tending to repel each other whereas if they had unlike poles they would attract each other and stick at the center movement of each "step."

The operation of this device is as follows; the switch 21 is closed which starts the electric motor 17 and moves the frames 31 containing the permanent magnet reciprocating means, in the direction of arrows 46 regardless of whether the reciprocating frames 31 are connected by the screw 26 or loops 63 to the propelling mechanism. This forward movement of a frame 31 causes the wheels 91 and 92 to roll over floor 11 and to which wheels the sectored gear wheels 28 and 29 are respectively attached with the result that, as the teeth of upper sector of wheel 29 for instance, see FIG. 3, mesh with the teeth of gear sponding distance, in respect to frame 31, due to the interconnecting pinion 35 as will be readily understood. When the gear tooth 43 of wheel 29 ceases to mesh with the teeth of gear rack 34 due to the dwell part of wheel 29 at the cut-away part 44, which is at the end of the reciprocating stroke of racks 33 and 34, the toothed sector of wheel 28 starts to mesh with rack 33, which is now at its rearmost position, and causes rack 33 to move forward while rack 34 simultaneously starts its rearward reciprocal movement, and so on. It will thus be apparent that the legs 37A begin to "walk" over plane surface 13 which causes considerable interest and enjoyment to onlookers as no mechanical connection to the figurines are visible and the action is truly lifelike. The permanent magnets 37, 38, 39 and 40 are attached to their respective racks by center riverts 84, see FIG. 1. A transparent glass or plastic window 85 is set flush into a small part of floor 13 so that the operator may accurately place any desired figurine directly over either of the permanent magnets. The floor 13 may be removably secured to the box 12 by means of pins 86. It will be apparent that the figurines may be caused to take smaller or larger steps by merely shortening or increasing the distance between the magnets on the racks 33A and 34A by means of the holes 87 and the speed of the steps may be increased or decreased by merely increasing or decreasing the number of sectors in each wheel 28 and 29. In order to simulate a more accurate walking action it is necessary to bend the knee, even slightly, at each forward step. In this case, as leg 71R makes a forward step as indicated by the dotted lines 80 in FIG. 6, it will be noted that the soft rubber toe 83 of the foot 81 has been bent downward so that it rubs or snubs against the floor 13 thus retarding its forward

motion in respect to leg 71R. However, leg 71R continues to move forward so that it slides in slot 82 of the shoe to a forward position therein which causes the pant leg 76R to bend at the knee at 79 until the leg reaches almost to the position 76L where the toe 83 will resume its normal position and discontinue its snubbing action. It will of course be understood that, as each forward step is taken, the leg bears slightly stronger against floor 13 and incidentally slightly raises body 65 as in walking. While I have shown only two reciprocating elements on each frame 31, it will be apparent that a larger number may be used and the elements may also be considerably longer, thus permitting a large number of figurines, such as soldiers marching, to be displayed.

From the foregoing description it will be apparent that I have evolved a device for faithfully simulating legged creatures in the act of walking or running in that the required locomotion given to the figurine is transmitted from suitable invisible reciprocating mechanism underneath the walking surface and transmitted magnetically to the feet of the figurine through the non-magnetic unbroken plane floor thus causing great interest and enjoyment to viewers and incidentally permitting an endless variety of figurines to be displaced in animated semblance; two legged creatures walking upright with natural bending of the knee at each step, while creatures are caused to walk side by side and suddenly separate to walk opposite and return to walk with some other creature.

Various changes may be made in the embodiment of the invention hereinabove specifically described without departing from or sacrificing the advantages of the invention as defined in the appended claims.

I claim:

1. An amusement device for simulating walking creatures comprising a plane surfaced floor, two laterally adjacent reciprocating elements, means for reciprocating said elements, said elements traversing said floor in the same direction as the reciprocations of said reciprocating elements, a permanent magnet attached to each of said reciprocating elements, said magnets loosely contacting the underside of an additional plane surfaced non-magnetic floor, said additional floor spaced above said first mentioned floor, and a two-legged erect walking figurine provided with an armature at the bottom of each foot of said figurine and adapted to be superimposed on the said additional plane surfaced floor above the aforesaid magnets, the legs of said two-legged figurine comprising the lower elements of a vertically disposed lazy-tong mechanism operable within the hollow body of said figurine.

2. An amusement device as in claim 1, the legs of said lazy-tong mechanism being covered by hollow pants adapted to bend at the kness.

3. An amusement device as in claim 1, the extreme lower end of each leg of said lazy-tong mechanism being pivoted to said armature, a rubber shoe covering said pivoted joint, said shoe being attached to the lower end of an encompassing pant leg, means for permitting said pant leg to be bent at the knee, a longitudinal slot in said rubber shoe for permitting said shoe with attached pant leg to slide rearwardly in respect to said leg and armature, and a rubber frictional toe on said shoe adapted to retard said shoe by frictional contact with said floor at each forward step of said leg.

4. An amusement device for simulating animative creatures comprising a plane surfaced floor, a second plane surfaced floor spaced evenly above said first mentioned floor, a plurality of pulleys journaled between said floors, an endless belt traversing said pulleys, a series of equally spaced pins attached laterally to said belt with one end of each of said pins protruding a short distance through a slot in said second floor, said slot being directly over the traverse of said belt, a reciprocating mechanism removably attachable to the aforesaid extending pins and adapted to traverse over the surface of said second floor

along with said belt, said mechanism including a plurality of reciprocating members and means for reciprocating said members a permanent magnet attached to each reciprocating member of said reciprocating mechanism, said permanent magnets loosely contacting the underside of a third plane surfaced broken non-magnetic floor evenly spaced over said second floor, and a legged figurine provided with an armature at the bottom of each foot thereof, the legs of said figurine being adapted to "step" in unison with the reciprocations of said reciprocating members.

5. An amusement device as in claim 4, the said reciprocating mechanism comprising a frame, a removable attaching means between said frame and aforesaid spaced extending pins, two oppositely disposed traction wheels attached to the same shaft which is journaled in said frame and rotatable over said second floor as said frame is drawn forward by said belt, and means on said rotatable traction wheels for alternately providing a forward movement to each reciprocating member.

6. An amusement device for simulating animated legged creatures as in claim 4, and an additional pulley journaled between the first and second floors, said pulley not being traversed by said belt, and an additional belt traversing over all of said pulleys on the inner side of said first mentioned belt, said latter belt being also provided with transversely attached upstanding pins.

7. An amusement device for simulating animated legged creatures as in claim 4, and a small portion of said upper floor above said reciprocating mechanism being of transparent material adapted to view said reciprocating mechanism passing underneath.

8. An amusement device for simulating legged creatures comprising a relatively thin, smooth and opaque non-magnetic horizontal plane surface, a legged figurine adapted to "walk" across said surface, an armature attached to the bottom of each foot of said figurine, a magnet underneath said plane surface directly underneath each of said armatures, and means for propelling said magnets alternately forward, said propelling means comprising a source of power, a wheeled frame rolled over a lower floor through said source of power, and two interconnected oppositely disposed reciprocating members geared to the wheels of said frame, the said gear connection between said wheels on said frame rolling over the said lower floor, and said reciprocating members being connected to said magnets and so proportioned

that the rearward moving reciprocating member is stationary relatively to the upper floor walking surface while the forwardly moving reciprocating member travels at twice the speed and distance of the traverse of said wheel over said lower floor.

9. An amusement device for simulating walking figurrack **34** and moves it forward in the direction of arrow **42**, the opposite gear rack **33** will move rearward a correines comprising a horizontally disposed plane surfaced floor, a wheeled frame adapted to traverse over said floor on the wheels of said frame, horizontally disposed reciprocating members positioned on the upper side of said frame, means on said rotatable wheels for imparting reciprocal movement to said reciprocating members as said frame moves across said floor, a magnet attached to each of said reciprocating members, a thin non-magnetic opaque floor mounted above and contiguous to said reciprocating magnets, and an armature formed in feet of a "walking" figurine adapted to be positioned directly over said reciprocating magnets on said non-magnetic floor.

10. An amusement device for simulating walking creatures comprising a horizontally disposed plane surfaced lower floor, a wheeled vehicle adapted to traverse said floor, means for propelling said wheeled vehicle over said floor in a predetermined endless circuit, two reciprocating members mounted to the upper face of said wheeled vehicle, geared connections between the wheels on said vehicle and said two reciprocating members for reciprocating said reciprocating members alternately forward and rearwardly as said vehicle traverses over said lower floor, a magnet attached to the upper face of each of said reciprocating members, an unbroken smooth non-magnetic upper floor mounted over and contiguous to said magnets, and a legged figurine having an armature in the feet of said figurine, said figurine adapted to "walk" over said non-magnetic upper floor under the magnetic influence of said magnets reciprocating under said upper floor.

11. An amusement device as in claim 9, and a non-reciprocating magnet attached to the upper side of said vehicle contiguous to and underneath the said last mentioned floor.

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