Aug. 11, 1964 R. ELLIS 3,143,826

FIGURINE AND MEANS FOR ANIMATING SAME

Filed Oct. 15, 1962 3 Sheets-Sheet 1

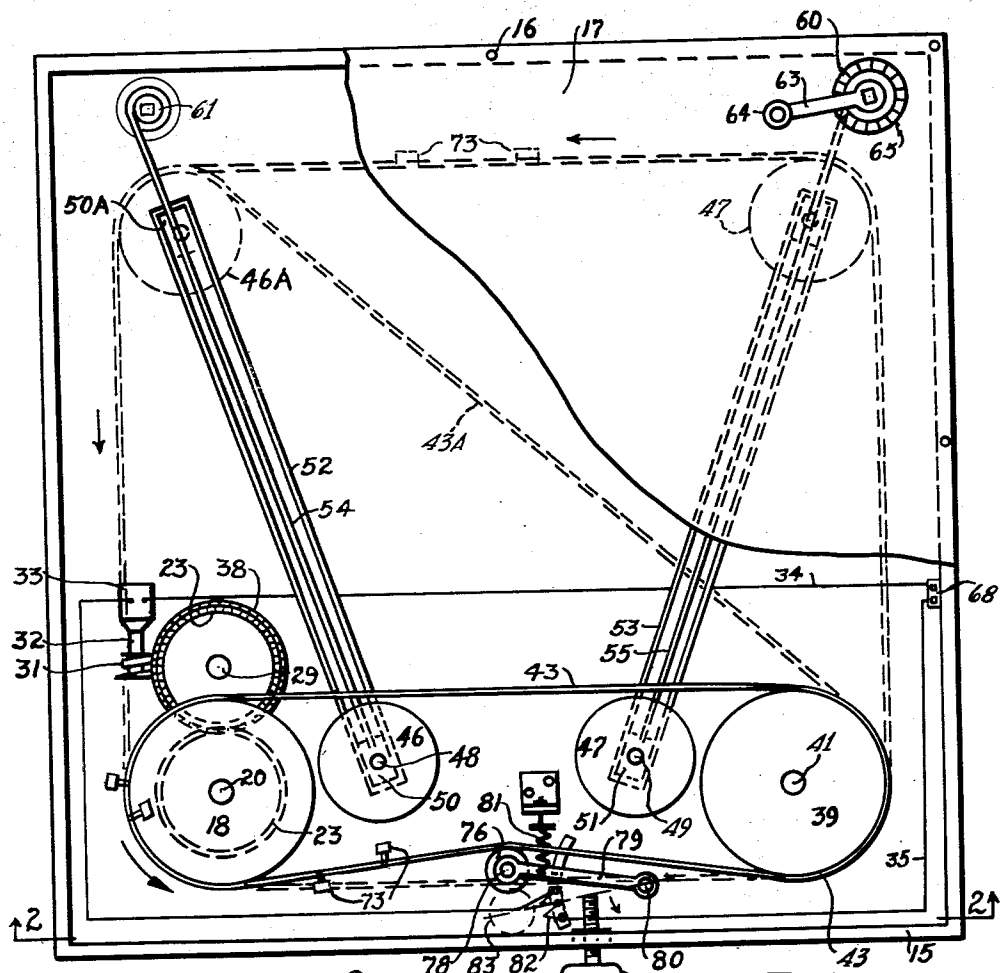


Fig. 1.

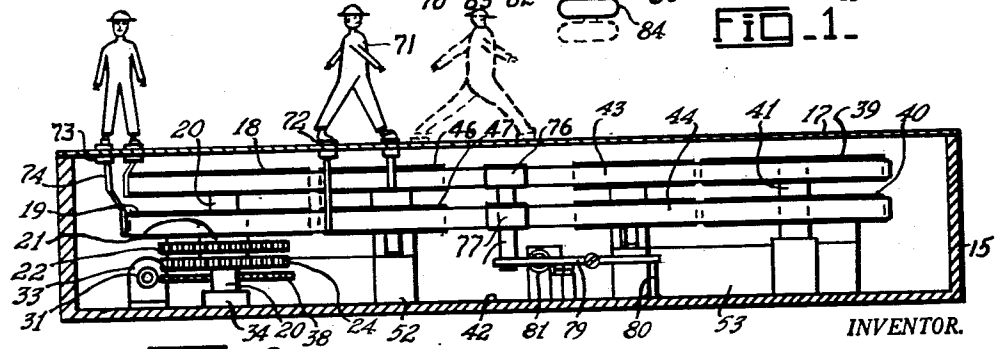


Fig. 2.

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Aug. 11, 1964 R. ELLIS 3,143,826

FIGURINE AND MEANS FOR ANIMATING SAME

Filed Oct. 15, 1962 3 Sheets-Sheet 2

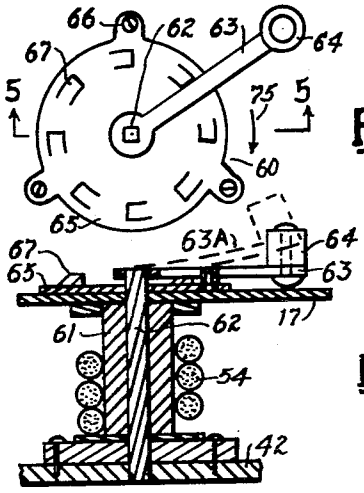


FIG. 4.

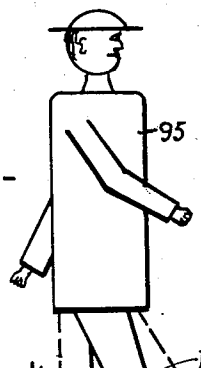


FIG. 5.

FIG. 6.

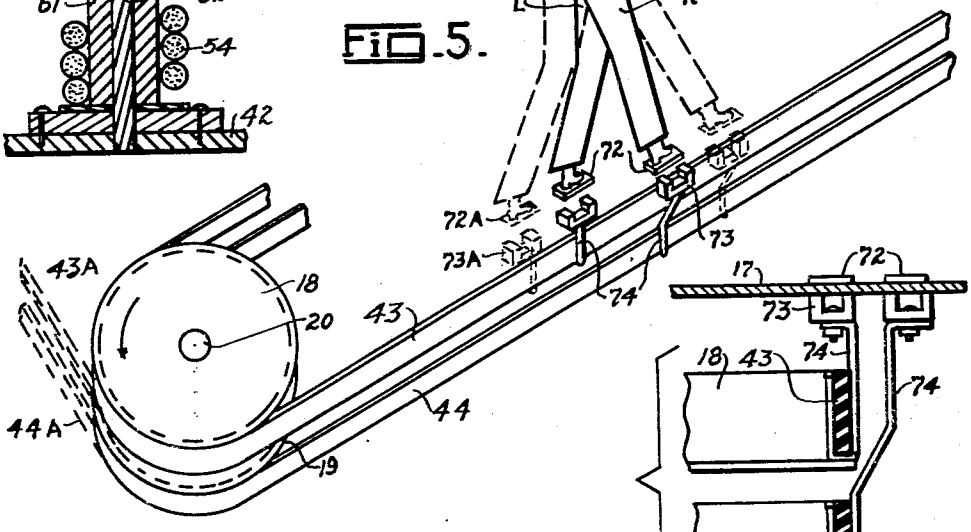


FIG. 7.

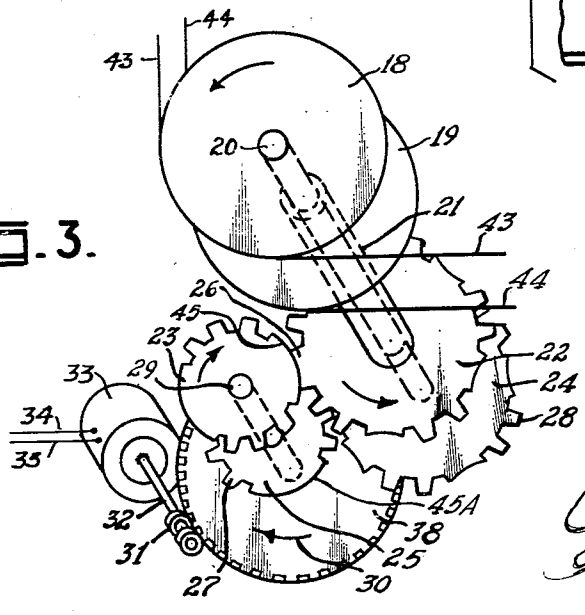


FIG. 3.

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Aug. 11, 1964 R. ELLIS 3,143,826

FIGURINE AND MEANS FOR ANIMATING SAME

Filed Oct. 15, 1962 3 Sheets-Sheet 3

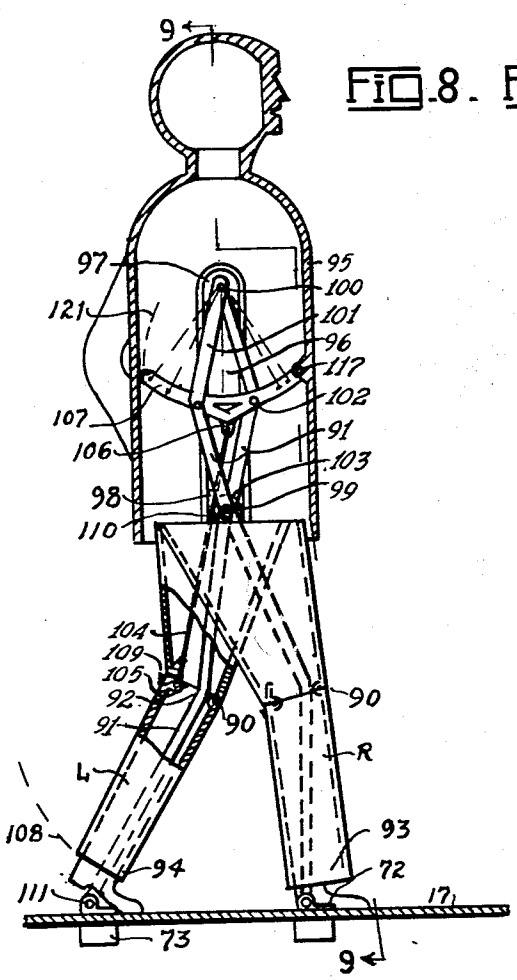


FIG. 8.

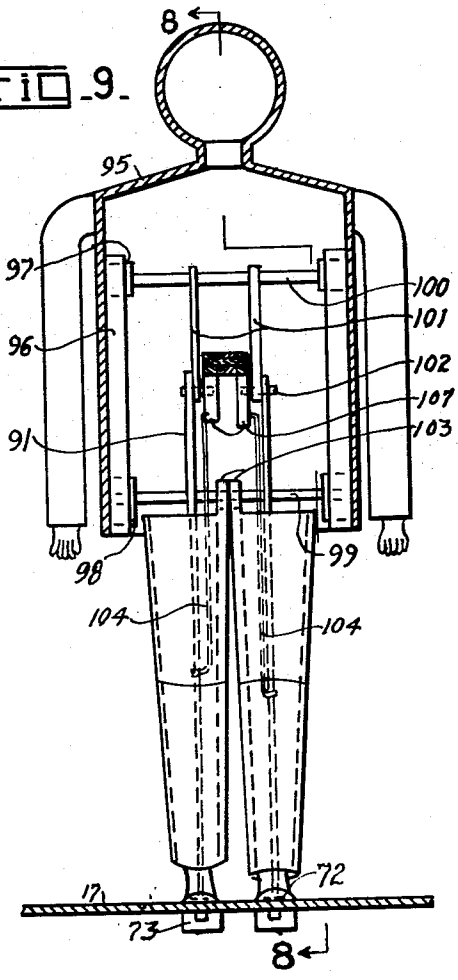


FIG. 9.

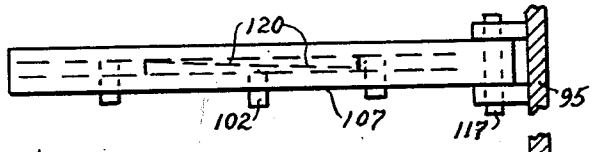


FIG. 10.

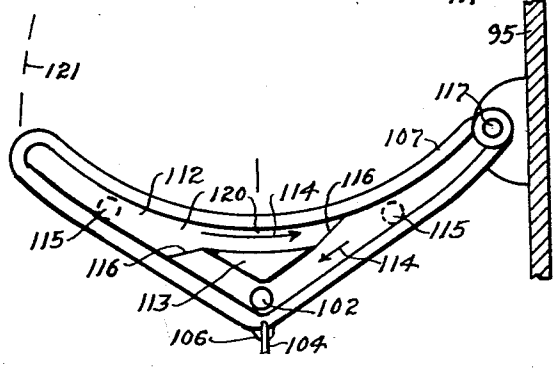


FIG. 11.

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United States Patent Office 3,143,826 Patented Aug. 11, 1964

3,143,826

FIGURINE AND MEANS FOR ANIMATING SAME

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Filed Oct. 15, 1962, Ser. No. 230,579
7 Claims. (Cl. 46—240)

This invention relates to figurines and means for animating same and the principal object of the invention is to improve on my previous Patent #2,942,378 issued June 28, 1960 in that, no slots are herein required on the walking surface for the figurines the necessary alternating forward movements of the legs of the figurines being secured through magnetic traction through the thin non-magnetic "walking surface."

Another object of the invention is the provision of means for imparting alternate forward motion to the legs of a figurine from two belts running over pulleys closely underneath the walking surface, permanent magnets being attached to the belts.

Another object of the invention is the provision of means for accellerating the "walking" figurines into "running" figurines by increasing the length of the step thereof by merely turning a small lever.

Another object of the invention is the provision of means for automatically speeding up the forward motion of the figurines to co-incide with the increased length of step thereof so as to exactly simulate a running creature.

And still another object of the invention is the provision of means preventing the speeding up of the forward motion of the figurines irrespective of the increased length of step thereof.

And yet another object of the invention is the provision of means for causing the figurines to traverse an endless variety of pathways over the walking surface even while the device is in operation.

And still another object of the invention is the provision of means for causing the figurines to bend at the knee of the forwardly stepping leg and simultaneously lift the forwardly stepping leg slightly to exactly simulate the act of walking.

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

FIG. 1 is a top view of the device with the non-magnetic flat unbroken floor broken away in part.

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

FIG. 3 is a diagrammatic view of the gear train used in translating continuous rotary motion into the required step by step alternating forward motion without un-natural jerking action.

FIG. 4 is a top view of the windlass used to alter the traverse of the figurines over the floor.

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

FIG. 6 is an isometric drawing illustrating how the length of the step of the figurine is increased.

FIG. 7 is an enlarged view of the attachment between the permanent magnets and the belts.

FIG. 8 is a section on the line 8—8 of FIG. 9.

FIG. 9 is a section on the line 9—9 of FIG. 8.

FIG. 10 is an enlarged top view of the cam which operates the knee joint.

FIG. 11 is a side view of FIG. 10.

Referring to the drawings in which like characters and numerals of reference refer to similar parts throughout the several views, the numeral **15** denotes a substantially square box to the upper edges of which is secured by screws **16** the thin non-magnetic cover **17**, preferably of sheet aluminum or plastic. Within the box **15** and underneath cover **17** are mounted the two similar pulleys **18** and **19** with pulley **18** attached to shaft **20** and superimposed over pulley **19** attached to hollow shaft **21**.

Shaft **20** projects through and rotates within hollow shaft **21**, the latter being attached to gear **22** which meshes with gear **23** and which together produce an intermittent forward motion to hollow shaft **21**. Similarly, the gears **24** and **25** respectively produce an exactly similar uniform intermittent motion to shaft **20** but the dwells occurring when part **45** of gear **23** slides over part **26** of gear **22**, for instance, are exactly opposite in time interval when the dwell part **45A** of gear **25** slides over part **26A** of gear **24**, thus providing alternate uniform intermittent motion to the legs of a figurine as will hereinafter be more fully described. See FIGS. 2 and 5 of my previous Patent #2,942,378. Gears **23**, **25** and worm gear **38** all are press fitted to shaft **29**, the worm gear **38** being driven in the direction of arrow **30** by worm **31** attached to shaft **32**, by electric motor **33** connected to wires **34** and **35**. The vertically disposed shaft **29** is rotatable within bearing **34** attached to bottom of box **15**. Thus, when the motor **33** causes the worm gear **38** to rotate, in the direction of arrow **30**, the shafts **20** and **21** together with pulleys **18** and **19** respectively will also rotate in the same direction but intermittently and alternately in equal time limits, as one pulley, say **19** dwells, due to parts **45** and **26** being in dwell position, pulley **18** will rotate, due to teeth **27** and **28** of gears **24** and **25** being in mesh at the same time, etc.

Additional pulleys **39** and **40**, similar to pulleys **18** and **19**, and in horizontal line therewith, are loosely mounted on vertical shaft **41** attached to floor **42**. Two endless belts **43** and **44** pass over pulleys **18** and **39** and **19** and **40** respectively, these belts **43** and **44** being composed of elastic material capable of stretching such as soft rubber, woven spring wire, etc., the reason for same being hereinafter described. Two idler pulleys **46** and **47**, attached to short shafts **48** and **49** respectively, and which shafts bear in square bearing blocks **50** and **51** respectively. These bearing blocks are slidably confined within longitudinal troughs **52** and **53** respectively and, attached to each block is a cable **54** and **55** respectively. Each of the troughs terminate near an upper corner of the box **15** as illustrated, the cables **54** and **55** each being adapted to be wound upon a windlass **60**, see FIGS. 4 and 5. This windlass is composed of a spool **61** securely attached to square shaft **62**, the top of which shaft protrudes through the cover **17** and into crank handle **63** to the end of which is knob **64**, while the lower end of shaft **62** is rotatable in floor material **42**. Also serving as a bearing for the upper end of shaft **62** is the disc **65** which may be secured to the cover **17** by screws **66**. Upstanding on the upper face of disc **65** are circularly disposed ratchet teeth **67** as illustrated.

The operation of this device is now as follows; in the position illustrated in FIGS. 1 and 2 the electric motor **33** is energized by inserting the customary attachment plug into the receptacle **68**, the circuit being completed through wires **34** and **35**, the pulleys **18** and **19** thus alternately rotating a small part of a revolution, just sufficient to cause one usual length walking step by the figurines **71** which are thus caused to "walk" over the unbroken cover **17**, there being a thin soft iron armature attached to the bottom of each shoe or hoof of the figurine and which armatures are magnetically attracted to the permanent magnets **73**, the magnets sliding along the undersurface while the armatures slide over the upper surface of the non-magnetic cover **17**. Each magnet **73** is attached to the top of flat spring **74**, the other end of each spring arm being looped so as to clamp the rubber belt **43** as better illustrated in FIG. 7. The figurine **71** will thus "walk" over cover **17** in a loop defined by the belt **43**. As will be readily understood, four-legged creatures may also be used so that the child may have an interesting menagerie all

in animated display before him. Any figurine may easily be lifted off cover **17** and replaced by another without stopping the device or the other animated creatures or apparatus so that an unlimited number of combinations may result. But even this interesting procedure may eventually bore an active child so I provide means for causing the figurines to walk faster and finally run in natural imitations by stretching belts **43** and **44** simultaneously by gradually rotating either one or both crank handles **63** of the windlass **60**, this causing cable **54** to wind upon spool **61** bringing bearing block **50** together with idler pulley **46** to position illustrated by dotted lines **50A** and **46A** which simultaneously stretches the belt **43** and **44** to position **43A**. As the elastic belts stretch, it will be apparent that the distance between magnets **73** also increase in direct proportion to that of the entire belt, thus causing the stride of the legs of the figurine to increase correspondingly to any distance between a slow walking step to a running stride depending on the extent of stretching of the belts, this depending on the distance the idler pulleys **46** and **47** are pulled towards the opposite corners of the box **15**. Idler pulley **47** may also be pulled towards its corner in the same manner, stretching the belts still further and simultaneously defining a different path for the figurines to traverse, in fact, it will be apparent that an unlimited number of pathways may be easily attained merely by manipulating the crank handle **63**, which handles are automatically secured in its last forward turning position by the edge of handle **63** contacting the upturned edge of a respective tooth **67**, the tension of the rubber belts holding the position taut. To release the idler pulley **50A** towards its normal position, the flat spring crank handle is merely lifted slightly, as illustrated by dotted lines **63A** in FIG. 5, so that it will pass over the protruding edges of teeth **67** and turned opposite in direction to arrow **75**.

The figurines thus not only take a longer stride simulating "running" but the speed of the belts and thereby the figurines are automatically increased to a "running" speed by means of idler pulleys **76** and **77** which are loosely mounted in superimposed position on shaft **78**, attached to lever arm **79** swingable around pivot **80** and held taut against belts **43** and **44** by helical spring **81**. In the walking position, as illustrated by the full lines in FIG. 1, the electric circuit has resistance wires **82** interposed within the circuit in series, thus causing the motor **33** to rotate at reduced speed but when the idler pulleys **46** and/or **47** are pulled towards the opposite corners of box **15**, the increased tension on belts **43** and **44** will force the idler pulleys **76** and **77** against tension of spring **81** into position shown by dotted lines **83** together with the lever arm **79**, upon which electrical contact (not illustrated) is mounted, thus cutting out the resistance **82** from motor circuit in proportion to the degree of stretching of belts **43** and **44** and permitting the motor to speed up. The increased length of stride of the figurines is thus automatically adjusted to the increased speed of natural running position. Protruding knob **84** may be manipulated to prevent the motor speeding up as above described by retaining lever arm **79** in original or intermediate position by screwing it in or out and allow the figurines to "walk" in any number of varied pathways by manipulating the idler pulleys **46** and **47** regardless, as will be readily understood.

In order to naturally simulate a person or animal while in motion, it is desirable to bend the knee on the forward step and this is best accomplished, in connection wth magnetically interposed traction, by providing a pivot joint **90** at the front end of the knee as better illustrated in FIGS. 8 and 9 wherein the operating lazy-tong mechanism or skeleton **91**, preferably made of steel strip, has a rearwardly bent leg part at **92** which, when the leg is straight (on the rearward step) causes the lower covering pants to part further away from the front thereof as at **93** than when the leg is moving forward when the interior of the lower pants part is adjoining the skeleton leg **91** as at **94**, thus giving the appearance of bending the knee. The body **95** and legs of the figurine is preferably composed of thin moulded plastic, there being a vertical trough **96** on each side of the body **95** in which an upper and lower bearing block **97** and **98** respectively are adapted to slide. The lower bearing block **98** receives the horizontal shaft **99** which shaft forms a fulcrum for both skeleton legs **91** while the upper bearing block **97** receives shaft **100** in the same manner. Connecting rods **101** bear loosely over shaft **100** at their upper ends while pins **102** loosely pivot their lower ends with the upper ends of legs **91**, thus providing a lazy-tong mechanism which enables a two-legged creature to stand upright and to be manipulated as in walking by suitable power applied to the feet. The body **95** of the figurine always rests by gravity onto the bearing block **97** while the legs R and L respectively are pivoted to shaft **99** by its lugs **103** and therefore raise and lower slightly as in natural walking as will be readily understood. The lower pant leg, L, which is shown in the act of taking a forward step, is beginning to bend at the kneepivot **90**, by action of the connecting rod or cable **104**, the lower end of which is attached to the lug **105** and the upper end thereof to the lug **106** being an integral part of cam **107** which maniplates the rod **104**, first upwardly to the middle of the step and thereafter downwardly again to the end of the forward step, the lower pant leg L swinging slightly around the pivot **90** as a center as indicated by dotted lines **108**, thus simulating the bending of the knee as in natural walking or running. As the knee is hindered in the extend of bending either by the inside of the pant leg impinging against the skeleton leg **91** at **94** or by the slight projection **109** striking the outer part of upper leg L and as the cam **107** has even a slightly higher lift, it will be apparent that the entire leg L will be lifted as in natural walking. The hole in the lug **103** at the upper end of each pant leg is slightly elongated as illustrated at **110**, thus permitting the forwardly moving leg to first bend its knee and then raise its leg slightly before putting its leg and foot down. During the meantime, the skeleton legs **91** remain as usual, the lower ends being pivoted at **111** to armature plate **72**. When the elastic belts **43** and **44** are stretched as previously described, the permanent magnets **73** will automatically increase their spacing as illustrated in FIG. 6, by **73A**, causing the armature plates **72** to follow thus also increasing the length of stride of the figurines as indicated by **72A** in dotted lines.

The cam **107** operates as follows: the pin **102** to which both connecting bars **101** and upper skeleton legs **91** are pivoted, extend into the curved slot **112** of the cam as better illustrated in FIGS. 10 and 11 and, as this pin is permanently magnetized, it remains seated therein. This pin **102** follows a back and forth movement around the slightly upstanding triangle **113** according to the arrows **114**, the dotted circles **115** denoting the limits of the walking position. The pin **102** must travel under the triangle **113** on the forward step and above the triangle on the return or rearward standing still period of the step on account of the slightly raised projections **116**, both of which drop as the pin **102** passes, the slot between rising slightly at **120** to compensate. The cam **107** is pivoted to the body at **117** as illustrated and moves up and down at the forward step as the pin **102** passes under the triangle **113**, slightly lifting the rod **104** during the first half of the forward step and then lowering the rod **104** during the second half of the forward step and which, being connected to the knee at **105**, will lift the lower half of the leg L as previously described. The legs R and L then alternate similarly at each step. The legs of four legged creatures may also be caused to bend the knees and slightly

raise the legs on the forward step in a similar manner, the four legs being interconnected as will be readily apparent. The pulleys **18**, **19**, etc. are all in the same horizontal plane. The cam **107** swings around arc **121** with pivot **117** as a center. As leg R dwells (while leg L is taking a forward step) its respective pin **102** traverses the upper course of slot **112** and neither the cam **107** nor the rod **104** connected to its respective knee, moves relatively. The idler pulleys **46** and **47** may also be placed outside of the belt loop **43** and the pulleys pushed instead of pulled into any desired position. The speed of the belts may be increased by gearing instead of as shown.

From the foregoing description it will be apparent that I have evolved an amusing, interesting, attractive and educational toy which has a great variety of applications and modifications such as animated figurines of all kinds walking and running in a natural manner, some chasing others, starting the running or walking action without stopping the device, altering the pathways at the will of the operator also without stopping, picking off individual figurines and substituting others again without stopping the device and incidentally causing the knees of the figurines to bend in a natural manner, all operating over an unbroken flat surface without any mechanical connection between the operating mechanism and the acting figurines, proving mystifying and highly interesting to both operator and onlookers.

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 animative walking creatures comprising a thin unbroken non-magnetizable platform, a plurality of pulleys rotatable closely underneath said platform, two endless belts one superimposed over the other and looped around said pulleys, means for rotating said pulleys and belts in one direction alternately and intermittently, a permanent magnet attached to each of said belts, said magnets spaced apart a maximum distance of one ordinary walking step of an associated legged figurine and contacting the underside of said thin unbroken non-magnetizable platform, and a legged figurine adapted to traverse the upper surface of said platform immediately above said permanent magnets, the legs of said figurine being pivoted thereto, said legged figurine having an armature at the bottom of each foot thereof and being adapted to "walk" in unison with the alternate forward movements of said magnets underneath said platform.

2. An amusement device as in claim 1, the said endless belts being elastic and stretchable, means for stretching said belts with means for retaining said belts in stretched position.

3. An amusement device as in claim 1, the said belts being elastic and stretchable, an idler pulley rotatable within said belt traverse, means for pulling said idler pulley together with a section of said elastic belt in a separate direction angular to said original belt traverse, and means for retaining said idler pulley in any intermediate position between the minimum and maximum distance possible of said idler pulley traverse.

4. An amusement device as in claim 1, the said legged figurine having a skeleton lazy-tong mechanism and a hollow body in the shape of the desired creature surrounding said skeleton, the aforesaid armatures being pivoted to the lower ends of said skeleton, a similar vertical slot on the inner sides of said body, means for depending said hollow figurine body to said skeleton within said opposite slots, a cam pivoted to the inside of said body, an elongated bearing at the connection of the upper leg parts to the fulcrum of the legs of said skeleton, both lower leg portions of said body pivoted to the upper leg portions at the knees, and a pin connecting said skeleton parts adapted to operate in said cam, and means for bending said knee and simultaneously slightly lifting the leg of said figurine at each forward step by the action of said pin on said cam.

5. An amusement device for simulating animative walking creatures comprising a thin unbroken non-magnetizable platform, a plurality of pulleys rotatable closely underneath said platform, two endless belts one superimposed over the other and looped around said pulleys, an electric motor, gears between said motor and said pulleys, said gears adapted to translate the rotary motion supplied by the motor to intermittent alternating forward motion to said pulleys and belts, an electric resistance normally connected in electric series in the circuit of said motor, said resistance adapted to rotate said motor at reduced speed, a permanent magnet attached to each of said belts and physically contacting the underside of said platform, the maximum spacing between the magnets on said belts equalling an ordinary walking step of an associated figurine, a legged figurine adapted to traverse the upper surface of said platform immediately above said permanent magnets, the legs of said figurine being pivoted thereto, said legged figurine having an armature at the bottom of each foot thereof, said armatures being magnetically attracted to said magnets and adapted to "walk" in unison with the alternate forward movements of said magnets underneath said platform, the said endless belts being elastic and stretchable, means for stretching said belts and retaining said belts in any desired stretched position, and means for "cutting out" automatically the electric resistance in said motor circuit to speed up the motor as said belt is stretched.

6. An amusement device as in claim 5, the said electric resistance being cut out of the electric motor circuit in direct predetermined proportion to the degree of stretching of said belt.

7. In an amusement device, a figurine having its legs animated to "walk" in an original traverse over a platform, two permanent magnets attached a "walking" distance apart to two alternately forward moving belts underneath said platform, said belts being elastic and stretchable, and means for stretching said belts into a different and lengthier traverse and simultaneously increasing the speed of said belts to a "running" speed of said figurine and also simultaneously increasing the distance between said permanent magnets to a "running" step to the legs of said figurine.

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