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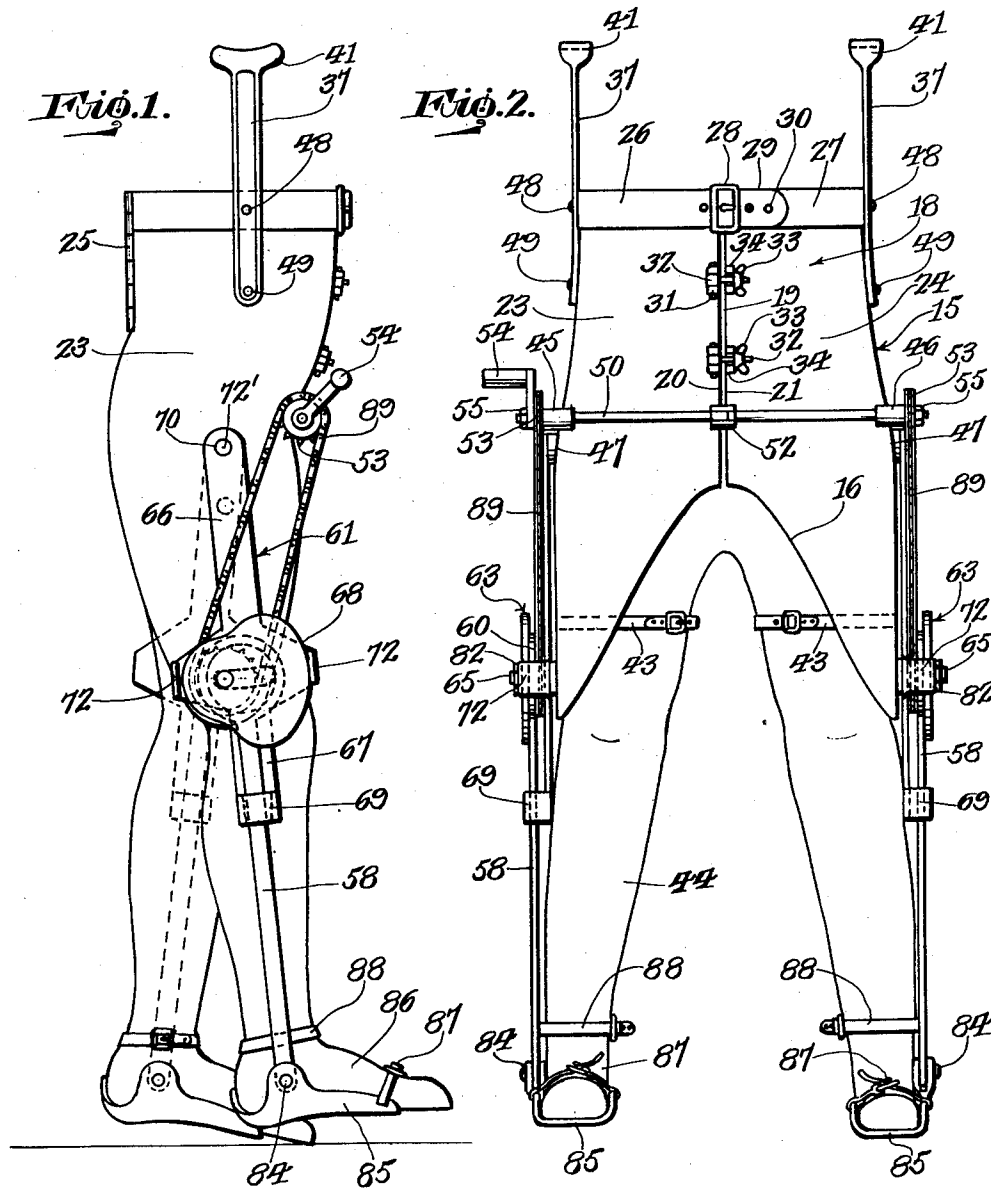
G. L. COBB

2,010,482

WALKING MOTION

Filed May 26, 1934

3 Sheets-Sheet 1



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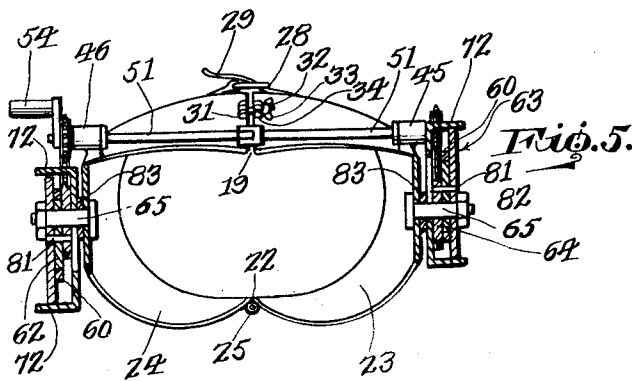
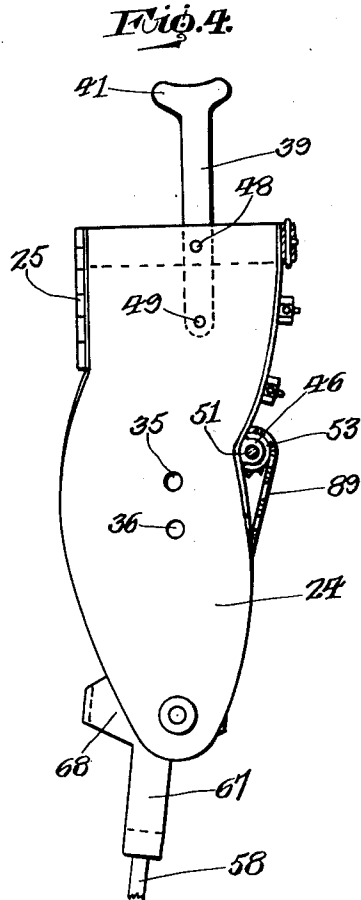
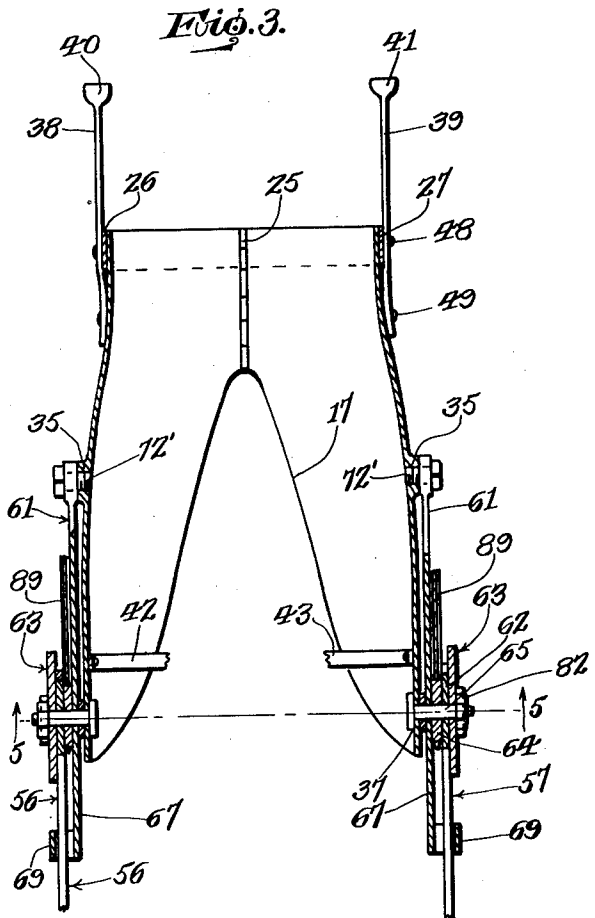
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WALKING MOTION

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3 Sheets-Sheet 2



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WALKING MOTION

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3 Sheets-Sheet 3

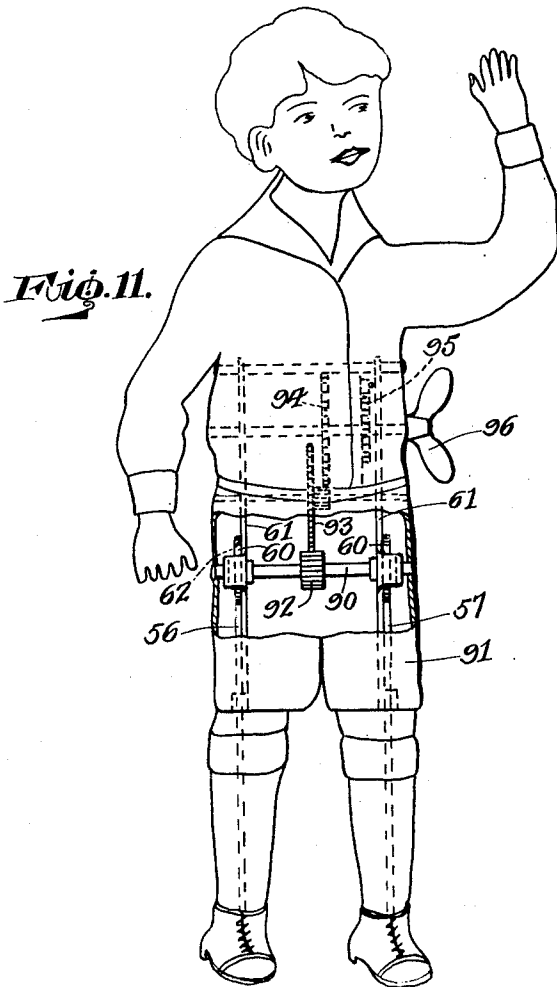
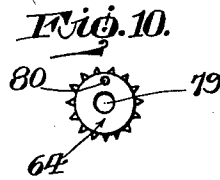
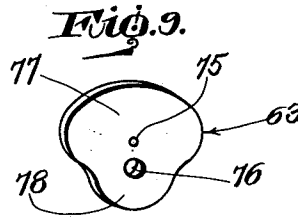
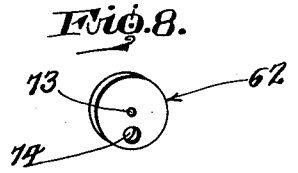
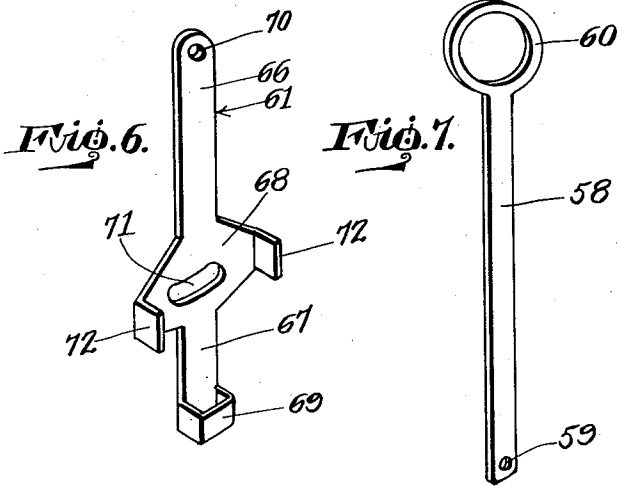
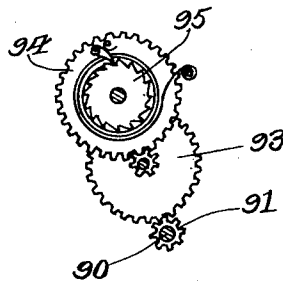


Fig. 12.



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UNITED STATES PATENT OFFICE

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WALKING MOTION

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6 Claims. (Cl. 3—1)

This invention relates to walking motion and is designed primarily for use for crippled persons, but it is to be understood that a walking motion, in accordance with this invention may be employed in any connection for which it is found applicable, and the invention has for its object to provide, in a manner as hereinafter set forth, a structural arrangement providing when applied to cause the legs to simulate the natural walking movement of a person.

A further object of the invention is to provide, in a manner as hereinafter set forth, a walking structure for persons having no use of their legs.

A further object of the invention is to provide, in a manner as hereinafter set forth, a walking structure including a pair of driven mechanical movements functioning to cause the legs to simulate the natural walking movement of a person.

Further objects of the invention are to provide, in a manner as hereinafter set forth, a walking motion structure which is comparatively simple in its construction and arrangement, strong, durable, readily assembled, thoroughly efficient for the purpose intended thereby, and comparatively inexpensive to set up.

To the above ends essentially, and to others which may hereinafter appear, the invention consists of such parts and such combination of parts which fall within the scope of the invention as claimed.

In the drawings:—

Figure 1 is a side elevation of the walking motion showing the latter installed with respect to the legs, feet and a portion of the body of a user.

Figure 2 is a front elevation of the walking structure as applied to the user.

Figure 3 is a vertical sectional view of the walking motion.

Figure 4 is a view similar to and taken at right angles to Figure 3.

Figure 5 is a section on line 5—5, Figure 3.

Figure 6 is a perspective view of the form of oscillatory combined cam abutment and guide element employed.

Figure 7 is a like view of the form of lifting rod used.

Figures 8, 9 and 10 respectively are elevations of the form of disc, cam and sprocket wheel forming elements of each mechanical movement used.

Figure 11 is an elevation of a doll showing the adaptation therewith of a modified form of walking motion in accordance with my invention.

Figure 12 is a detail illustrating the driving means for the modified form.

With reference to Figures 1 to 5 there is shown a combined supporting, bracing and carrier device or element 15 which is adapted to be coupled in encompassing and overlapping relation with respect to that portion of the body of the wearer extending from a point slightly above the knees to the chest. When element 15 is positioned upon the wearer, it is of a shape so it will conform to the contour of the portions of the body which it encompasses and overlaps. The element 15 is set up from any suitable metallic material. The element 15 has its front and back formed with tapered cutouts 16, 17 respectively, which extend from the bottom thereof to a point above the crotch of the user. The element 15 comprises a body 18 split centrally of its front as at 19, to provide a pair of opposed end edges 20, 21 extending from the top of the cutout 17 to its upper end. The body 18 is split centrally of its back from a point extending from the top of the cutout 17 to its upper end. The split at the back of body 18 is indicated at 22. The splits 19 and 22 form body 18 into a pair of oppositely disposed sections 23, 24 of like form having a hinge connecting means 25 bordering the edges provided by the split 22, as well as extending across the latter whereby sections 23, 24 are coupled together in shiftable relation with respect thereto.

The upper marginal portion of the outer face of section 23 has secured thereto a strap 26 which extends from one side of said means 25 to beyond the edge 20. The upper marginal portion of the outer face of the section 24 has secured thereto a strap 27 which extends from the other side of said means 25 to the edge 21. The front end of strap 27 is provided with a buckle 28. The extended end portion 29 of strip 26 has a row of spaced openings 30 for coaction with the buckle 28. The front of section 23 in proximity to edge 20 has pivotally connected therewith, as at 31 a series of superposed spaced coupling bolts 32 carrying wing nuts 33. The bolts 32 are adapted to extend through spaced superposed grooved guides 34 secured to the outer face of section 24 in proximity to the edge 21. The nuts 33 are adapted to be adjusted to abut the guides 34 whereby the front ends of the sections 23, 24 are detachably connected together for maintaining element 15 in position upon the wearer.

Each side of body 18 is formed with a pair of spaced superposed openings 35, 36 (Figure 4) for a purpose to be referred to. The openings 35, 36 at one side are arranged in alignment with the

openings 35, 36 at the other side of the body 18. Each side of body 18 in proximity to its lower end is formed with an opening 37 for a purpose to be referred to. The openings 37 are arranged in alignment. Secured to the upper part of the outer faces of the sections 23, 24 are vertically disposed under arm supports 38, 39 respectively having curved head parts 40, 41 respectively for positioning in the arm pits of the wearer. The sections 23, 24 have secured to the inner faces of the lower portions of the sides thereof straps 42, 43 respectively for coupling the lower ends of the sides of the said sections to the legs 44 of the wearer.

At the front of the sides of the sections 23, 24 bearing brackets 45, 46 are secured. These brackets are arranged in alignment and positioned above and in close proximity to the hip covering part 47 of body 18. The openings 35 are arranged slightly below said brackets at the tops of said parts 47. The supports 38, 39 are secured to the straps 26, 27 as at 48, and to the sections 23, 24 as at 49.

Journalled in the brackets 45, 46 are shafts 50, 51 respectively which are disposed in endwise alignment. The said shafts extend across the front of body 18 at the groin covering part thereof. These shafts rotate in unison and are detachably connected together at their inner ends for such purpose by a coupling sleeve 52. These shafts project beyond the outer ends of the brackets and have fixed thereto adjacent their outer ends sprocket pinions 53 which oppose the outer ends of the brackets. The shaft 50 is provided with a crank handle 54 for the purpose of rotating the shafts in unison. Retaining nuts 55 are mounted on the outer ends of the shafts.

The motion includes a pair of simultaneously operable oppositely disposed mechanical movements alternately operating in opposite directions and each for the purpose of imparting simultaneously vertical and oscillatory movements to a lift rod to provide a walking motion for the legs of the wearer. The lift rods are designated 56, 57 and are of like form. With reference to Figure 7 the form of the lift rods employed is illustrated and it consists of a narrow oblong elongated stem 58 provided with an opening 59 in proximity to its lower end and which terminates at its upper end in an annulus 60 of materially greater diameter than the width of said stem.

Each of the mechanical movements includes an upstanding oscillatory combined cam abutment and guide element 61, an eccentric in the form of a shifting disc 62 for a lift rod, a cam 63 coacting with disc 62, a sprocket wheel 64 and a supporting shaft 65, common to and upon which said disc, cam and wheel are revolubly mounted.

The element 61 consists of an upper and a lower portion 66, 67 respectively and an intermediate portion 68. The portion 66 is in the form of a narrow flat oblong shank. The portion 67 is in the form of a narrow flat oblong stem of less length than the portion 66 and having integral with its outer face at its lower end the arms of an outwardly directed yoke 69 which constitutes a guide for the stem 58 of a lift rod. The portion 66 in proximity to its upper end is apertured, as at 70. The intermediate portion 68 is of a height greater than the width of and is disposed laterally in opposite directions with respect to the portions 66, 67. The portion 68 tapers in opposite directions from a point adjacent its vertical median and is formed at its longitudinal

median with an arcuate slot 71 intersected centrally by said vertical median. Each side of portion 68 has an arrestor ear or lug 72 extended outwardly at right angles to its outer face for abutment by cam 63 during the revolving of the latter. The element 61 is slidably mounted on shaft 65, as the latter extends through slot 71. The element 61 is pivotally mounted at its upper end, and in this connection attention is directed to Figure 3 which discloses a pair of threaded headed pivot members 72' engaging with the walls of the openings 35, as well as being extended laterally from the sections 23, 24. Each member 72 is extended through the opening 70 at the upper end of an element 61 whereby the latter is pivotally supported suspendingly with respect to a side of a section 23 or 24.

The disc 62 is formed with an axial opening 73 and an eccentrically disposed opening 74, and through the latter extends the shaft 65 whereby disc 62 is eccentrically mounted on said shaft. The diameter of disc 62 corresponds to the inner diameter of and is mounted in annulus 60. The openings 73 and 74 are disposed in superposed alignment.

The cam 63 has an axial opening 75 and an eccentrically disposed opening 76 and through the latter extends the shaft 65 whereby cam 63 is eccentrically mounted on said shaft. The area of cam 63 is materially greater than that of disc 62 and sprocket wheel 64. The cam consists of a substantially oval shaped part 77 and a substantially semi-circular part 78 which merges into the inner side of part 77. The latter projects laterally in opposite directions beyond and with respect to the edge of part 78. The part 77 is of greater height than that of part 78. The opening 75 is arranged in part 77. The opening 76 is at the point of mergence of the parts 77, 78. The openings 75 and 76 are disposed in superposed alignment.

The sprocket wheel 64 is formed with an axial opening 79 for the passage of the shaft 65 and with an eccentrically disposed opening 80 superposed with respect to the opening 79.

The annulus 60 with disc 62 arranged therein is to be disposed in spaced relation with respect to the outer face of the intermediate portion 68 of element 61 and is so shown. The sprocket wheel 64 is to be arranged between disc 62 and the outer face of the intermediate portion 68 of element 61 and is so shown. The cam 63 is to oppose the outer faces of the annulus 60 and disc 62 and have edge portions thereof oppose the outer portions of the inner faces of the lugs 72 and is so shown. When the disc 62, wheel 64 and cam 63 are in the position as aforesaid the openings 74, 76 and 79 align with each other, and through said aligning openings, as well as the slot 71 extends the shaft 65. The latter projects beyond the cam 63. When the disc 62, wheel 64 and cam 63 are in the position as aforesaid the openings 73, 75 and 80 align with each other and extending through openings 73, 75 and 80 is a pin 81 for bodily securing the disc 62, wheel 64 and cam 63 together whereby they will bodily revolve in unison. The outer end of shaft 65 carries a retaining means 82 which opposes the outer face of cam 63 and functions to maintain the cam upon said shaft. Positioned on the latter between the intermediate portion 68 of element 61 and the outer face of the side of a body section 23 or 24 is a spacing collar 83.

When the annulus 60, disc 62, cam 63 and sprocket wheel 64 are arranged relatively to

each other and to element 61 in a manner as referred to, the stem 58 of a lift rod passes down through the guide yoke 69 at the bottom of element 61. The lower end of stem 58 is pivotally connected, as at 84 to the outer side of a tread member 85 in which is positioned one of the feet 86 of the wearer. The member 85 is secured to foot 86 by a coupling strap 87. The stem 58 is secured to the lower limb of a leg 44 by a coupling strap 88.

The sprocket wheels 64 are operated by endless transmission belts 89 driven from the sprocket pinions 53. The belts 89 depend from and are inclined rearwardly with respect to the pinion 53.

The power mechanism for the wheels 64 is provided by the shafts 50, 51, sprocket pinions 53, crank handle 54 and the transmission belts 89, and when operated will drive the mechanical movements in a direction to provide for the legs of the wearer walking in the proper order, that is to say giving an up and down movement from the eccentrics and a swinging forward and backward movement from the cams in connection with the elements 61. As a cam revolves in the same direction as its associated eccentric there is produced a forward swinging raising movement followed by a rearward swinging downward movement for a leg, or in other words each mechanical movement provides simultaneously combined vertical and oscillatory movements for each leg. The legs alternately move in opposite directions with respect to each other.

With reference to Figures 11 and 12, the walking motion is shown applied to a doll and operated from a spring motor. In the form shown in Figure 11 the shafts 50, 51, sprocket pinions 53, transmission gears 64, belts 89, elements 18, 38, 45, 42, 43 and 84 to 88 are dispensed with. The walking motion as shown in Figure 11 includes a driven shaft 90 arranged within the doll body 91. The shaft 90 carries a gear 92 which is operated from a gear wheel 93 forming an element of an operating mechanism 94 driven by a windable spring motor 95. The latter and mechanism 94 is also arranged within the doll body 91. A winding means 96, arranged exteriorly of the doll body 91 is provided for motor 95. The walking motion shown in Figure 11 includes a pair of lifting rods 56, 57, a pair of pivoted elements 61 and a pair of discs 62 of the same form as shown by Figures 6, 7, 8, and 9 respectively. The elements 61 are slidably mounted on shaft 90. The discs 62 are eccentrically mounted upon and rotate with shaft 90. The discs 62 are mounted in the annuli 60 of the rods 56, 57. The rods 56, 57 and elements 61 are arranged in the doll body 91. The rods 56, 57 extend to and are connected to the feet of the doll body. The parts as referred to with respect to Figure 11 will provide for a walking motion similar to that as referred to with respect to Figures 1 to 5.

The superposed openings 35, 36 at the side of a body section 23 or 24 permit of the adjusting of an element 61 to increase or decrease the throw of a leg. When the pivots 72 are mounted in openings 35 the leg throw is less than that when the pivots 72 are mounted in openings 36.

With reference to Figure 11 the discs 62 are fixed to the shaft 90 so that they will bodily rotate in unison with the latter.

What I claim is:—

1. In a walking motion, a pair of oscillatory vertically movable leg lifting rods travelling simultaneously in opposite directions and each having its upper end provided with an annulus, a pair

of oppositely disposed driven eccentrically mounted discs, each arranged in an annulus, a pair of oppositely disposed driven cams, each opposing a disc and an annulus and bodily moving with a disc, a pair of oppositely disposed upstanding oscillatory pivotally suspended spaced combined cam abutment and rod guide elements travelling simultaneously in opposite directions and each being formed intermediate its ends with an arcuate slot and a pair of spaced parallel cam abutments, and a supporting means for said discs and cams extending through said slots, said combined cam abutment and rod guide elements being formed at their lower ends with outwardly directed guides for the passage therethrough of said rods.

2. In a walking motion, a pair of oscillatory vertically movable lifting rods adapted to be coupled with the feet and legs of a user travelling simultaneously in opposite directions and having an annulus at their upper ends, a supporting means, a pair of oppositely disposed spaced discs eccentrically and revolvably mounted on said means, a pair of spaced sprocket wheels concentrically and revolvably mounted on said means inwardly of said discs, a pair of oppositely disposed spaced cams eccentrically and revolvably mounted on said means outwardly of said discs, a combined supporting, bracing and carrier device adapted to be secured to the user and having said supporting means connected thereto, a pair of spaced oppositely disposed upstanding oscillatory combined cam abutment and rod guide elements pivotally suspended at their upper ends from the sides of said device simultaneously travelling in opposite directions and being formed intermediate the ends with an arcuate slot for the passage of said means and a pair of spaced parallel abutments for a cam, means for connecting one of the discs, a cam and a sprocket wheel together to provide for them revolving in unison, and means supported by said device for driving said sprocket wheels for imparting combined oscillatory and vertical movements to said rods in alternate directions.

3. In a walking motion of the construction as set forth in claim 2, tread members for attaching to the feet of the user, said rods being pivotally connected at their lower ends to said tread members, and straps for connecting said rods to the legs of the user.

4. In a walking motion, a pair of spaced oscillatory vertically movable lifting rods travelling simultaneously in opposite directions adapted to be attached at their lower ends to objects for imparting a walking action thereto, each of said rods being formed with an annulus at its upper end, a pair of oscillatory oppositely disposed combined abutments and rod guide elements simultaneously travelling in opposite directions and each having a laterally extended intermediate portion opposing one of said annuli, each of said rods extending upwardly through the lower terminal portion of one of said elements, each of said elements provided in the said intermediate portion thereof with a transverse slot, a pair of oppositely disposed mechanical movements, each including a pair of eccentrically mounted revolvable parts, each pair of parts operating a rod and an element in unison, one of said parts of each pair of parts arranged within and coacting with one of said annuli, the other part of each of said pairs of parts coacting with and abutting the intermediate portion of one of said elements, said movements including shafts for revolvably sup-

porting said parts, said shafts extending at one end into said slots, and supporting means for the other end of said shafts.

5 In a walking motion, a pair of spaced combined oscillatory-reciprocatory lifting rods travelling simultaneously in opposite directions and adapted to be attached to a pair of spaced objects for imparting a walking action thereto, a pair of oppositely movable oscillatory oppositely disposed
10 pivotally suspended combined abutment and rod guide elements, each having an arcuate slot intermediate its ends and means at its lower end providing a guide passage for a rod, each of said rods being formed with an annulus at its upper
15 end, and a pair of oppositely disposed revoluble driven means having supporting shafts extending into said slots and each including an eccentrically mounted disc positioned in an annulus and an eccentrically mounted cam arranged adjacent the
20 disc, said discs and cams on the operation of the driven means coacting respectively with said rods and elements for imparting simultaneously combined oscillatory-reciprocatory movements to said rods and oscillatory motion to said elements to
25 produce the walking motion.

6. In a walking motion, a pair of upstanding

oppositely movable combined oscillatory reciprocatory one-piece lifting rods travelling simultaneously in opposite directions and adapted to have coupled with their lower ends a pair of spaced objects for imparting a walking motion to the latter, a pair of oppositely disposed upstanding oscillatory pivotally suspended combined
5 abutment and rod guide elements, the guide means on each element being formed for the passage of and for connecting a rod thereto, said
10 guide means being located at the lower ends of said elements, each of said elements, at a point intermediate the ends thereof being formed with a transverse slot, suspending means for said elements, a pair of oppositely disposed revoluble
15 driven means including shafts extending into said slots and into said suspending means, each of said driven means including a pair of parts, the parts of each pair coacting with a rod and the
20 element to which the rod is connected for imparting respectively a combined oscillatory and reciprocatory movement to such rod and an oscillatory movement to such element thereby providing a walking motion for the rod.

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