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FOOT PROPELLED SKATE

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FIG. 1.

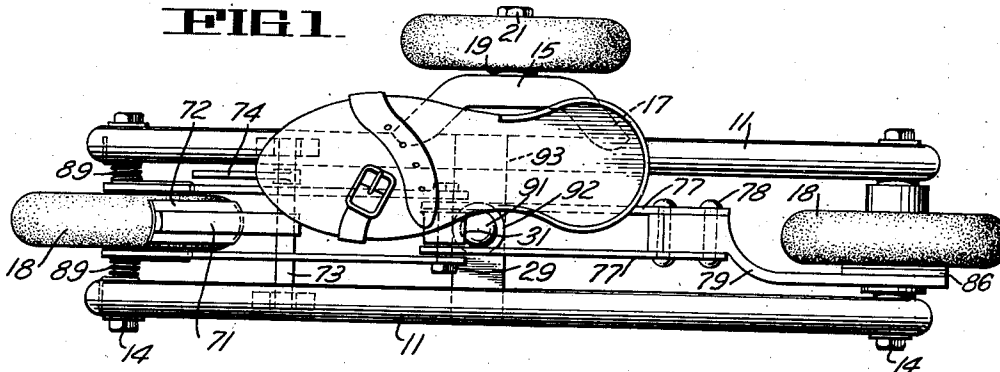


FIG. 2.

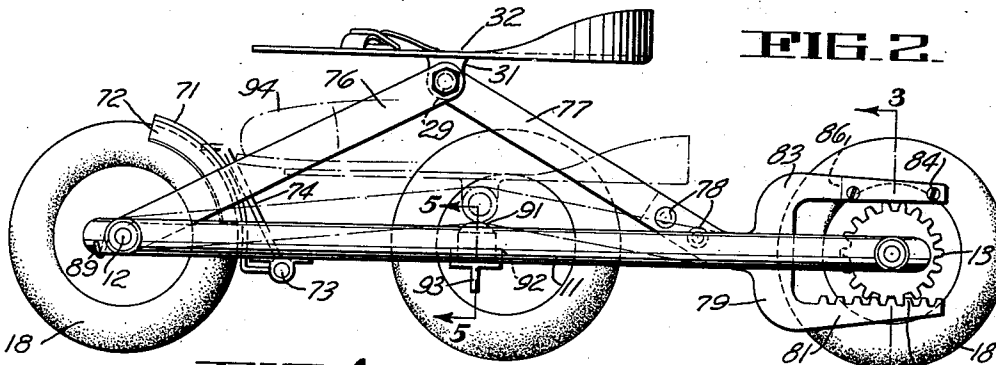


FIG. 4.

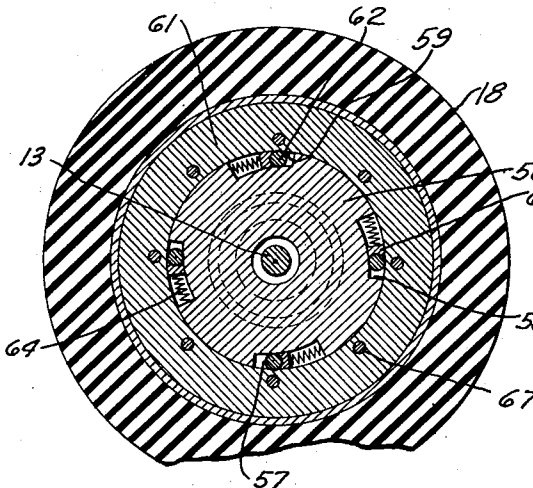


FIG. 3.

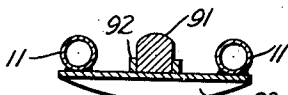
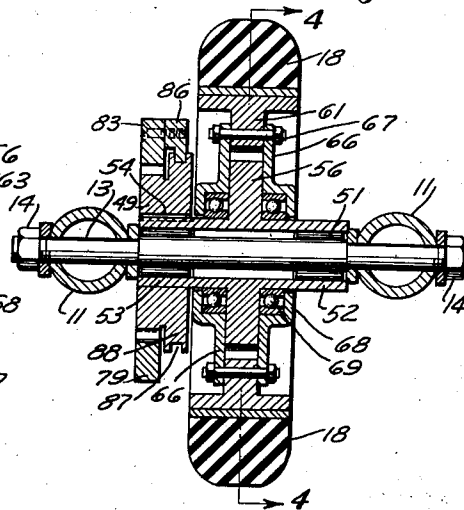


FIG. 5.

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FOOT PROPELLED SKATE

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1 Claim. (Cl. 280—11.11)

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This invention relates to wheeled devices in the nature of roller skates.

It is an object of the invention to provide a device of the character described which is geared to derive motive power from the user when the latter executes the natural motions of walking.

Another object of the invention is to provide, in a device of the character described, drive mechanism whose leverage progressively increases along a rising parabolic curve from the institution of the power stroke to the termination thereof.

A further object of the invention is to provide, in a device of the nature referred to, separated driving and braking means, the latter of which is operable by a slight modification of the motions employed in actuating the driving means.

Other objects and features of advantage will become apparent to those skilled in the art to which the invention pertains as the detailed description of the invention, hereunto annexed, proceeds. It is to be understood that the invention is not to be limited to the specific forms thereof herein shown and described as various other embodiments thereof may be employed within the scope of the appended claim.

Referring to the drawings:

Figure 1 is a top plan view of the power skate of my invention.

Figure 2 is a side elevational view of the structure illustrated in Figure 1.

Figure 3 is a vertical sectional view, to an enlarged scale, of the driving wheel. The plane in which the view is taken is indicated by the line 3—3 of Figure 2.

Figure 4 is a vertical sectional view of the driving wheel taken in the plane indicated by the line 4—4 of Figure 3. Portions of the view are broken away so as to conserve space in the drawing.

Figure 5 is a vertical sectional view of the treadle stop. The plane in which the view is taken is indicated by the line 5—5 of Figure 2.

In detail, and with reference to Figure 1 of the drawing, the device of my invention comprises a frame having spaced parallel side members 11 which are connected together at their respective ends by axles 12 and 13 each of which is secured in place by means of nuts 14 or otherwise. An outrigger member 15, also included in the frame structure, parallels one of the side members 11 and is formed with angularly bent end portions 17 welded or otherwise secured to the side member at points intermediate the ends of the latter. Ground-engaging wheels 18 are provided which are journaled, respectively, on the axles 12 and 13 and also on a stub axle 19, mounted on the member 15, and secured thereon by means of a nut 21 or other suitable device. The wheels 18 are arranged, in a horizontal plane,

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to form a triangular pattern so as to lend stability to the device and the rearmost wheel of the group, which is mounted on the axle 13, is adapted to be power-driven and will hereinafter be referred to as the driving wheel.

Means is provided, operative by the weight of the user's body during the normal motions of walking, for energizing the driving wheel so as to urge the skate along the ground, or other supporting surface, in a forward direction.

The driving wheel 18 is provided with an over-running clutch in which the axle 13 is provided with anti-friction bearings 51 on which is journaled a tubular member 52 forming the hub for the driving wheel. An axial extension 53 of the hub is provided to which the gear 49 is affixed by means of a key 54 or by other suitable means thus connecting the hub for rotary movement with the gear train. The hub 52 also carries an integral flange 56 which is provided in its periphery with a plurality, preferably four, of notches 57 whose bottom surfaces 58 are angularly inclined with respect to the curvature of the bore 59 of an annular rim structure 61 which is journaled on the flange 56. The surfaces 58 and 59, together with the respective ends of the notches, form chambers which are convergent, in radial cross-sectional dimension, in a circumferential direction counter to the direction in which it is desired that the wheel be rotatively driven. Each chamber is provided with a dogging member 62 slightly larger in radial thickness than the shallowest radial depth of the notch and a follower block 63 engaged by a compressed coil spring 64 bearing against the adjacent end of the notch, serves to urge the dogging member toward the shallow end of the notch and thereby maintain the member in constant peripheral engagement with the surfaces 58 and 59. Side plates 66, which are attached by bolts 67 to the rim structure 61, have recessed portions 68 therein concentric with the hub 52 and fitted with bearings 69 which journal the rim structure 61 on the hub 52 and consequently on the axle 13. The side plates 66 also close the axial ends of the notches 57 so that the dogging members 62 and their associated parts are retained in the chambers. With reference to Figure 4, when torque is applied from the driving means tending to rotate the flange 56 in a counter-clockwise direction the dogging members 62 will each tend to wedge itself toward the shallow end of its chamber. This will create such radial friction between the surface of the member and the surfaces 58 and 59 that the flange 56 and the rim structure 61 will become locked together so that rotational movement of the flange will be duplicated in the rim structure and consequently in the driving wheel 18. Conversely, clockwise rotational movement of the flange 56 will tend to urge the

dogging member 62 toward the deep end of its chamber until radial friction has been reduced to the point wherein the surface 59 will slide freely over the member. Thus the flange and rim structure are released for relative counter rotation until such time as the flange is again moved in a counter-clockwise direction. The type of device just described possesses the advantage of instantaneous clutching engagement anywhere in its rotational movement which means that the strokes of the treadle and rocking links 76 may be varied as desired instead of being confined to defined increments.

Means is provided for arresting forward movement of the skate, when the latter is under way, by a slight modification of the normal leg movement employed in powering the device. Overlying the periphery of the front wheel, as shown in Figures 1 and 2, is an arcuate brake arm 71 carrying a pad 72 of friction material such as brake lining or rubber which is interposed between the periphery of the wheel and the arm. The arm 71 is attached at its lower end to a shaft 73, disposed transversely of and mounted for rotary movement in the frame, the shaft being extended at the end underlying the treadle 32 and fitted with a forwardly extending lever 74. The lever 74 lies outside of the normal path of movement of the treadle as shown in Figure 2. However, it will be seen that if the treadle, when in its lower position, is rocked forwardly slightly about the axis of the pin 29, the lever 74 may be engaged with as much pressure by the foot 94 of the operator as desired which action will cause the lever 74 to be forced downwardly thus urging the brake pad 72 to bear against the periphery of the front wheel and thus arrest or stop rotational movement of the latter.

Pivotally mounted on the forward axle 12 is a pair of parallel, rearwardly and upwardly extending rocking links 76 pivotally connected, at their upper ends to a treadle pivot pin 29 carried by ear 31 preferably formed integrally with and depending from the underside of the treadle 32. A similar pair of links 77, also pivoted on the pin 29, extend rearwardly and downwardly to terminate in a connection, effected by the rivets 78, with a yoke 79 having a lower arm portion 81, provided with rack teeth 82 meshing with the gear 49, and an upper arm portion 83 to which is secured, by screws 84 or otherwise, a cross-head 86 which is in sliding engagement with a peripheral groove 87 formed in a disk-like extension 88 of the gear 49. The purpose of the cross-head 86 is to prevent separation of the rack teeth 82 with those of the gear 49 axially of the latter. A pair of torsion springs 89 concentric with the axle 12 and anchored at their respective ends to the frame members 11 and to the rocking links 76 serve to urge the latter upwardly toward their upper limit of travel. The structure just described forms a toggle lever arrangement whose power output from the start to the completion of its stroke rises very rapidly as the link members are brought closer to linear alignment. Of course, employment of the toggle link type of drive shown in Figure 2 requires that the over-running clutch previously described be used and this mechanism has been shown in Figure 4 in association with the drive apparatus for the gear 49. Also, means is provided for limiting the downward flexing of the toggle members comprising a rubber bumper 91 which is carried in a socket 92 mounted on a cross-member 93 extending transversely between the frame members 11

and positioned to be engaged by the portions of the rocking links 76 and the links 77 adjacent the pivot pin 29.

The action of the link and lever drive, arranged to constitute the well-known toggle mechanism familiar to the average mechanic, is to develop maximum power in the forward impetus given to the skate during each driving stroke of the treadle. When the skate is under way a certain amount of momentum will be stored therein from the previous power stroke which is more than sufficient to maintain movement of the device during the recovery part of the treadle stroke.

In the foregoing description of my invention I have described in detail a single power skate adapted to be worn on the foot of the user. It is, of course, obvious that a separate skate is to be provided for each foot. The structure of Figure 1 is adapted to be worn by the right foot and it will be apparent to those skilled in the art that similar devices for use by the left foot may be provided by arranging the parts shown in reverse aspect. It will also be apparent to those skilled in the art that substitutions of parts and modification of design may be accomplished in the basic designs shown. Most of these however are within the realm of knowledge of the average skilled mechanic and are intended to be embraced within the scope of the appended claim.

I claim:

A skate adapted to derive motive power from the body weight of the user imposed thereon during the normal motions of walking, comprising a carriage having ground-engaging wheels thereon, at least one of which is a driving wheel, a rocking link mounted on said carriage for pivotal movement in a vertical plane, a treadle mounted on said rocking link and adapted to securely engage a leg portion of the user, a gear associated with said driving wheel, a reciprocable toothed element meshing with said gear, a cross-head carried by said toothed element, a disk carried by said gear having therein a peripheral groove in which said cross-head is slidably engaged, a link connecting said toothed element and cross-head with and to be reciprocated by and upon movement of said rocking link, an over-running clutch interposed between said gear and said driving wheel for connecting together said gear and driving wheel for unidirectional movement, and brake mechanism operative by said treadle, and disposed at a position in the path of movement of the operator's foot carried by said treadle, for engaging and resisting rotational movement of one of said carriage wheels.

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