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54 **Exercise machine.**

57 A moving staircase exerciser comprises an end-less loop of steps each of which is a rigid unit of riser and thread, and each step is pivoted to the next. Each pivot is extended at each end, laterally of the step, to carry rollers which run in tracks at each side. The tracks are U-shaped so that the rollers are conveyed from one straight run carrying the steps in the position for use, to the other straight run carrying the inverted steps on a return movement, and the steps are conveyed between the guides at the other end via a Geneva mechanism.

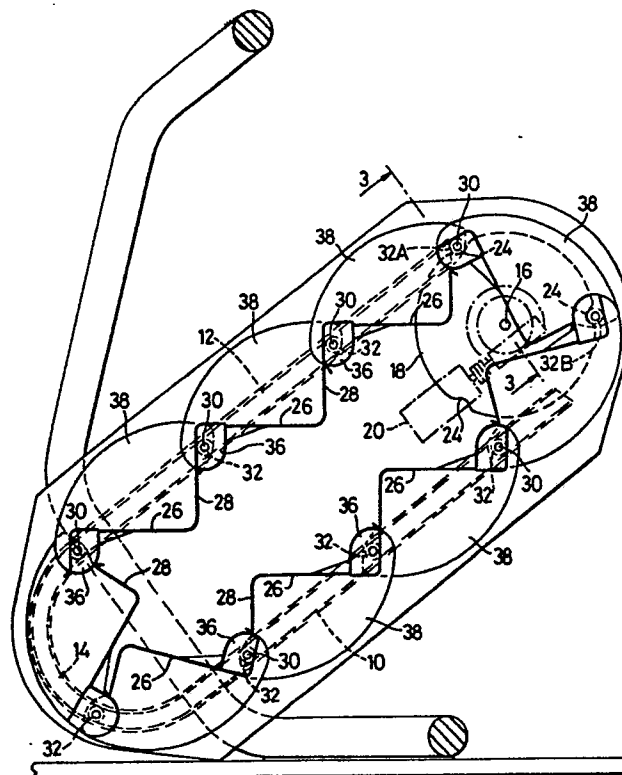


Fig. 1

**EP 0 369 564 A2**

## EXERCISE MACHINE

This machine relates to exercise machines of the kind comprising a moving staircase. In such machines, there is a series of steps, and the person taking the exercise perpetually ascends the staircase, using energy to displace the stairs downwardly or simply using energy to lift the use of legs with the user's weight displacing the stairs, so that the user actually marks time and stays in the same place. The movement may be braked to provide resistance or the staircase may be governed to run at a particular speed.

One known moving staircase exerciser in U.S. P 3 497 215 has a pair of endless chains e.g. roller chains with the steps lying between those chains. The steps are pivoted to shafts carrying rollers at each end and the rollers run in an endless loop track. The chains follow a different course from the track at the ends of the loop, that is the points where the individual stairs invert to run through a return portion of the loop. This allows the chains to extend linearly between each two shafts even at the ends of the loop. However, the chains and track form an expensive and complex part of the complete exerciser.

In U.S. P 3 592 466 the rollers and the complex track for them is avoided by extending the chains about sprockets at each end of the loops, but this fails to take account of the difference in length between the straight line configuration of the chain between adjacent pivotal connections successive steps, and the length along the curve where the chain extends around the sprockets: and without some other but completely unexplained (in the Patent) mechanism to allow for this, it may be that this arrangement is unworkable.

Finally, in U.S.P 4 687 195 sprockets are also used, but the steps are made in two parts pivoted together at the junction between each tread and each riser as well as between each riser and each tread. This allows the part to pivot as the chains pass around the sprockets and so avoids the need for an expensive track but requires more complex steps and still requires the expensive chains.

The object of the present invention is to provide an exerciser of this kind which will be more economical to manufacture and hence less expensive.

According to the invention, a moving staircase exerciser comprises a plurality of steps, each step having a riser and a tread fixedly connected together, and each step being pivoted to the next step so as to make an endless loop of steps, a pair of straight guides at each side of the staircase, a wheel or roller on each end of each pivot axis between each two adjacent steps, the wheels or

rollers running in or on said guides, and a geneva wheel mechanism for carrying the wheels or rollers from one guide to the other of the same pair at least at one end of the guides.

By the term geneva wheel is meant a rotating structure having a plurality of recesses about its periphery and spaced apart at suitable distances so that when one pivot is engaged in one recess and the structure rotates, the next recess moves into position to pick up the next pivot and so on. The number of recesses and hence the number of pivots engaged with the geneva wheel at any time will depend upon the design but in general the minimum number will be three.

The geneva mechanism may be provided at one end of the loop only. The guides may consist of a pair of e.g. parallel straight portions for example of angle or channel section in or on which the wheels or rollers run, but preferably the guides form U-shaped structures so that the parallel portions are connected by an arcuate portion at one end, and the geneva mechanism is provided at the other end.

The invention is now more particularly described with reference to the accompanying drawings wherein:

Figure 1 is a diagrammatic elevation;

Figure 2 is an enlarged view of a single step; and

Figure 3 is a sectional view showing the Geneva mechanism on an even more enlarged scale.

The machine comprises a skeleton frame with an appropriate casing (not shown) supporting two U-shaped track assemblies each of which is made from a length of channel section material, with the U's lying in parallel planes and with the mouths of the channels facing one another. Each track assembly has two parallel portions 10, 12 and a curved portion 14 connecting adjacent ends.

The curve 14 is at the bottom of the upwardly inclined track portions, and at the top is located shaft 16 carrying geneva wheels 18. The shaft is driven by motor 20 via appropriate gear connections and with suitable control circuitry and the like. The geneva mechanism has three equi-spaced recesses 24.

The steps comprise a series of generally L-shaped components of which one limb 26 forms a tread and an adjacent integral part 28 forms a riser. The top of each riser is formed with a knuckle joint or pivotal connection at 30 connecting it to the next adjacent tread. Each hinge pin connecting two steps extends transversely of the steps at each end to carry a roller 32 at each end and the rollers are

arranged to run in the channel section tracks.

The rollers, or possibly the pivot shafts 30 are also arranged to engage in the recesses 24. Thus in the illustration, rollers 32a, 32b are engaged in two of the recesses and the third geneva recess is disengaged. At other points in the location of the geneva wheels 18 only a single shaft is so engaged and two of the recesses 24 are empty.

In more detail, the step construction may comprise a light alloy extrusion of constant cross-sectional shape cut in suitable lengths, one length to each step, and providing an area 36 at the outer edge of each tread and also carrying the pivot joint with the adjacent riser, together with an L section length of metal plate or sheet metal bent to provide the major portion of the tread 26 and the riser 28, and a pair of side plates 38 which are apertured in two places for a pair of the pivot shafts 30 to extend therethrough, one at the top and one at the bottom of each step and each of those shafts connecting the adjacent steps. The side plates may be for example brazed or welded to the sheet metal or metal plate and to the extrusion so that each step is a relatively rigid unitary whole.

The complete apparatus may be associated with hand rails which the user may grasp to maintain balance, and any required control panel can be mounted on the hand rails.

It will be appreciated that in use the steps run down the track portion 12, invert and travel around the curved track portion 14 to run substantially inverted along the return track portion 10 before undergoing a second reversal via the geneva mechanism for re-use.

wheels or rollers from one straight portion to the other at one end and the Geneva serving a like function at the other end.

3. An exerciser as claimed in Claim 2 wherein the guides are of channel section and are located mouth-to-mouth.

4. An exerciser substantially as hereinbefore described and with reference to and as shown in the accompanying drawings.

## Claims

1. A moving staircase exerciser comprising a plurality of steps, each step having a riser and a tread fixedly connected together, and each step being pivoted to the next step so as to make an endless loop of steps, a pair of straight guides at each side of the staircase, a wheel or roller on each end of each pivot axis between each two adjacent steps, the wheels or rollers running in or on said guides, and a geneva wheel mechanism for carrying the wheels or rollers from one guide to the other of the same pair at least at one end of the guides.

2. An exerciser as claimed in Claim 1 wherein the guides are U-shaped so as to have two parallel portions, one of which receives and guides the wheels or rollers of the steps in their position for use, and the other of which receives and guides the wheels or rollers of the steps undergoing an inverted return movement, the curved portion of the U joining the straight portions serving to guide the

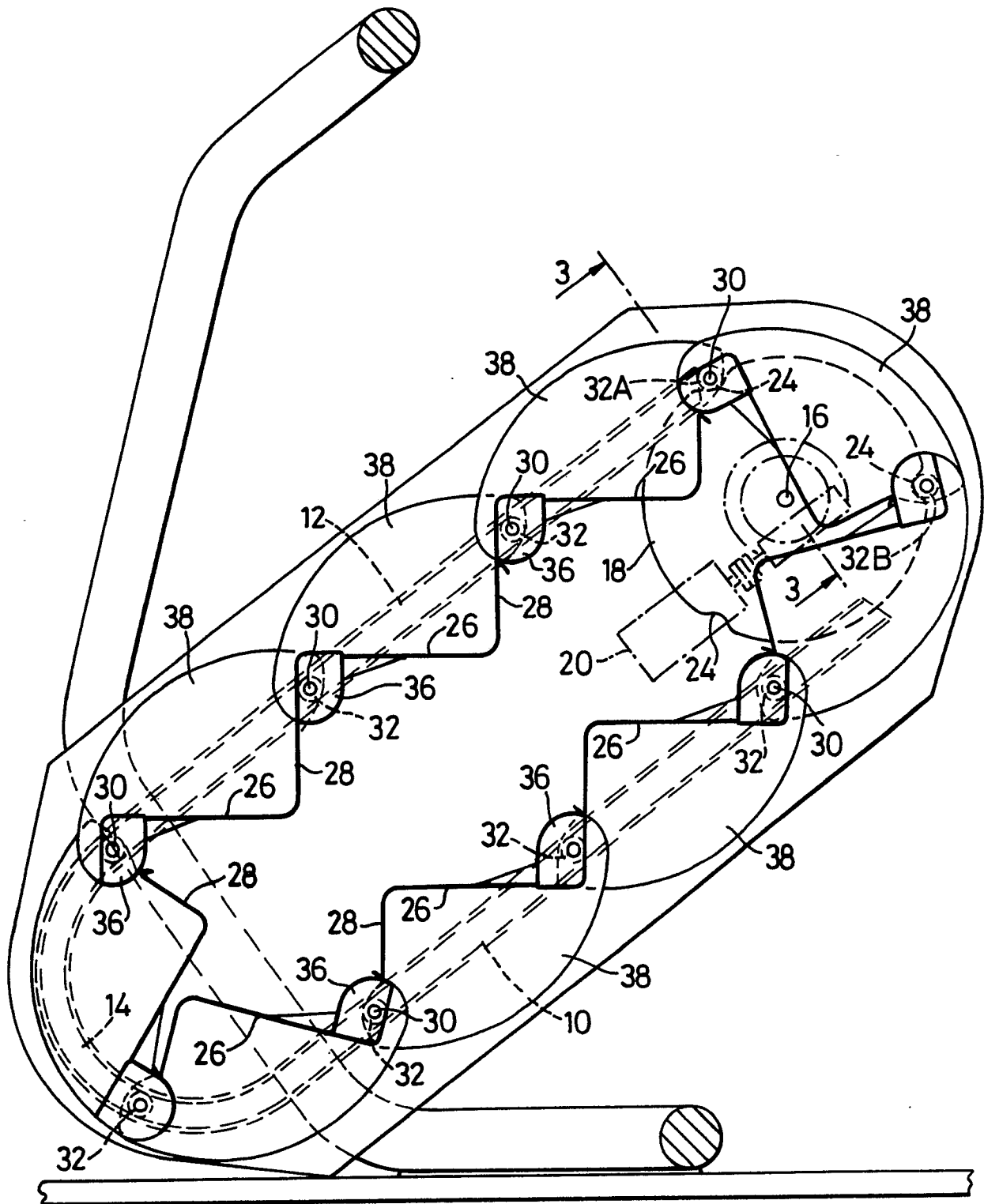


Fig. 1

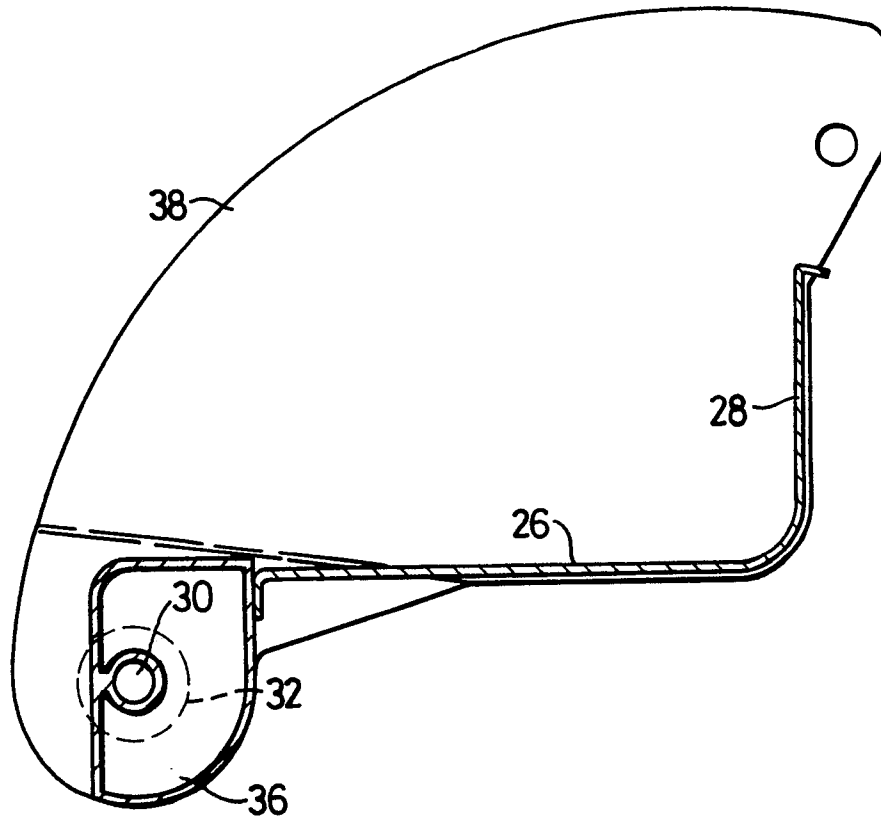


Fig. 2

