Improvements in exercising apparatus for therapeutic purposes / [Max Herz].

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Complete Specification Left, 17th May, 1898—Accepted, 2nd July, 1898

PROVISIONAL SPECIFICATION.

Improvements in Exercising Apparatus for Therapeutic Purposes.

I, Dr. Max Herz, of IX Schwarzspanierstrasse 18, Vienna, in the Austrian Empire, Physician, do hereby declare the nature of this invention to be as follows:—

Mechanico therapeutical apparatus such that the patient has to perform a definite and measurable amount of work by overcoming resistances in certain movements, are objectionable, because the intensity of this work does not vary during the prescribed movement in accordance with the variation of the capacity of the muscles for work, as the part of the body which exerts the power changes its position by the movement.

Thus the forearm which in one part of its movement is extended, in another part is bent inwards on the elbow joint and in other positions of the muscles and joint different exertions of power are required to effect like results.

The laws according to which the actions of the joints and muscles vary in exerting power have hitherto been based only hypothetically on theoretical considerations and experiments on animals, and mechanico-therapeutic apparatus have been constructed in accordance with these laws.

The improvements forming the subject of the present invention have for their object to avoid the objection above stated and to ensure that, in working with such apparatus during the whole movement the muscles shall be exerted in accordance with their momentary tension or pulling force.

The inventor has determined empirically the actual variations of the pulling force in human beings, and the resistance in his apparatus can be altered exactly according to these variations.

This may be effected in various ways. In all cases the load (the resistance) is caused to act upon a kinematic intermediate link or member the movement of which due to the motion of that part of the body which is exerting power produces a compensating alteration leverage. Such intermediate members are cams or their equivalents.

In the accompanying drawings, Figs. 1 and 2, are respectively a side and a front elevation of an apparatus according to my invention for mechanico therapeutical treatment of the arm. Figs. 3, 4, 5 and 6, shew modified arrangements of parts of the apparatus.

A is a standard or frame on the upper portion of which a shaft a with crank handle C is mounted the shaft carrying the compensating kinematic intermediate member which is a cam a^1. A lever d pivotted on the frame A, and loaded by a weight e, is connected by a cord, chain, rope or strap b to the cam a^1. By shifting the weight e along the lever d the work performed by turning the crank handle c^1 can be varied as desired.

If for instance the work consists in turning the crank c^1 in the direction of the arrow Fig. 1, so raising the weight e by moving the fore arm at the elbow joint,

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the radii of the cam a^1 corresponding to the various angular positions of the forearm, are determined so that the effort always remains the same.

Instead of a weighted lever (Figs. 1 and 2) weights e^1 (Fig. 3) such as metal discs may be employed, these being suspended in number corresponding to the desired work, on a cord, chain, or rope fastened to the periphery of the cam a^1.

Fig. 4 represents an arrangement in which the weights e^2 are on a rack b^1 which is pressed by a spring or weight against the periphery of a toothed cam a^2.

In the arrangement shewn in Fig. 5 the weight e^3 takes the form of a roller mounted on a lever f and pressing on the periphery of the cam a^1.

In the form of the apparatus partly shewn in Fig. 6, the cam a^3 is a cylindrical drum a^3 in which is cut a helical groove g of varying depth the loaded lever d is connected by a cord h fastened in the groove.

In order that when the drum a^3 rotates the cord b notwithstanding the helical form of the groove may always remain vertical, the shaft a has a screw thread a^5 of the same pitch working in the bearing a^4, so that the shaft as it rotates moves also lengthwise.

Dated this 4th day of September 1897.

ABEL & IMRAY,
Agents for the Applicant.

COMPLETE SPECIFICATION.

Improvements in Exercising Apparatus for Therapeutic Purposes.

I, Dr. Max Herz, of IX Schwarzspanierstrasse 18, Vienna, in the Austrian Empire, Physician, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

Mechanico therapeutical apparatus such that the patient has to perform a definite and measurable amount of work by overcoming resistances in certain movements, are objectionable, because the intensity of this work does not vary during the prescribed movement in accordance with the variation of the capacity of the muscles for work, as the part of the body which exerts the power changes its position by the movement.

Thus the forearm which in one part of its movement is extended, in another part is bent inwards on the elbow joint and in other positions of the muscles and joint different exertions of power are required to effect like results.

The laws according to which the actions of the joints and muscles vary in exerting power have hitherto been based only hypothetically on theoretical considerations and experiments on animals, and mechanico-therapeutic, apparatus have been constructed in accordance with these laws.

The improvements forming the subject of the present invention have for their object to avoid the objection above stated and to ensure that, in working with such apparatus during the whole movement the muscles shall be exerted in accordance with their momentary tension or pulling force.

The inventor has determined empirically the actual variations of the pulling force in human beings, and the resistance in his apparatus can be altered exactly according to these variations.

This may be effected in various ways. In all cases the load (the resistance) is caused to act upon a kinematic intermediate link or member the movement of which due to the motion of that part of the body which is exerting power produces a compensating alteration leverage. Such intermediate members are

cams or their equivalents such as unround discs, unround wheels grooved cylinders and the like.

In the drawings accompanying my Provisional Specification Figs. 1 and 2, are respectively a side and a front elevation of an apparatus according to my invention for mechanico therapeutical treatment of the arm. Figs. 3, 4, 5 and 6, shew modified arrangements of parts of the apparatus.

A is a standard or frame on the upper portion of which a shaft a with crank handle c is mounted the shaft carrying the compensating kinematic intermediate member which is a cam a^1 or unround disc capable of rotation. A lever d pivotted on the frame A, and loaded by a weight e, is connected by a cord, chain, rope or strap b to the periphery of the cam a^1. By shifting the weight e along the lever d the work performed by turning the crank handle c^1 can be varied as desired. If for instance the work consists in turning the crank c^1 in the direction of the arrow Fig. 1, so raising the weight e by moving the fore arm at the elbow joint, the radii of the cam a^1 corresponding to the various angular positions of the forearm, are determined empirically so that the effort always remains the same.

Instead of a weighted lever (Figs. 1 and 2) weights e^1 (Fig. 3) such as metal discs may be employed, these being suspended in number corresponding to the desired work, on a cord, chain, or rope fastened to the periphery of the cam a^1.

Fig. 4 represents an arrangement in which the weights e^2 are on a rack b^1 which is pressed by a spring or weight against the periphery of a toothed cam a^2.

In the arrangement shewn in Fig. 5 the weight e^3 takes the form of a roller mounted on a lever f and pressing on the periphery of the cam a^1.

In the form of the apparatus partly shewn in Fig. 6, the cam a^1 is replaced by a cylindrical drum a^3 in which is cut a helical groove g of varying depth the loaded lever d is connected by a cord c fastened in the groove.

In order that when the drum a^3 rotates the cord b notwithstanding the helical form of the groove may always remain vertical, the shaft a has a screw thread a^5 of the same pitch working in the bearing a^4, so that the shaft as it rotates moves also lengthwise.

Having now particularly described and ascertained the nature of this invention and in what manner the same is to be performed, I declare that what I claim is:—

Exercising apparatus for therapeutical purposes wherein an intermediate kinematic member such as a cam or unround disc such as a^1, or unround wheel such as a^2, or a drum such as a^3 with a groove of varying depth, is provided, upon which the resistance acts and by the movement of which the length of leverage of the load is so varied as to compensate for the empirically determined inequalities of muscular strain due to the varying positions of the part of the body by which force is exerted, substantially as described.

Dated this 17th day of May 1898.

ABEL & IMRAY,
Agents for the Applicant.

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A.D. 1897. Sep. 4. N°. 20,374.

HERZ'S Provisional Specification

(1 SHEET)

Fig.1

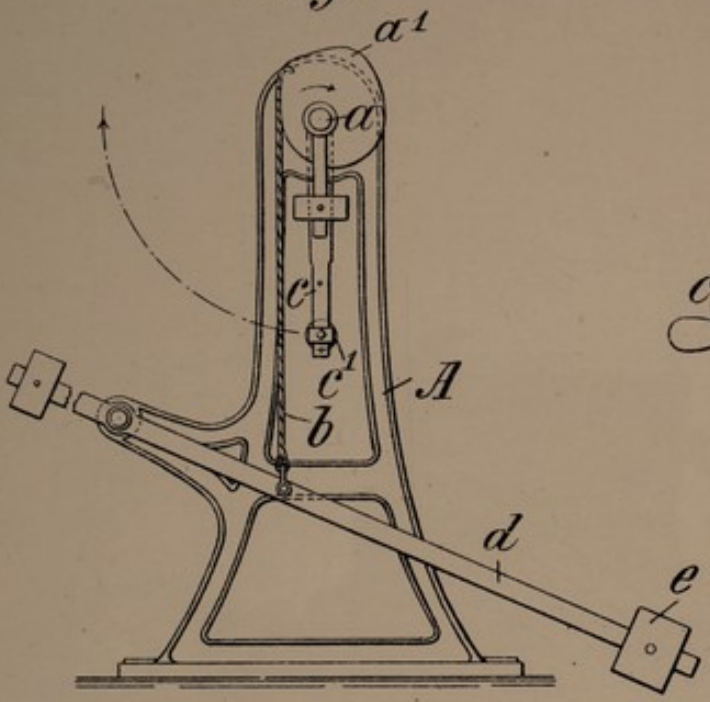


Fig.2

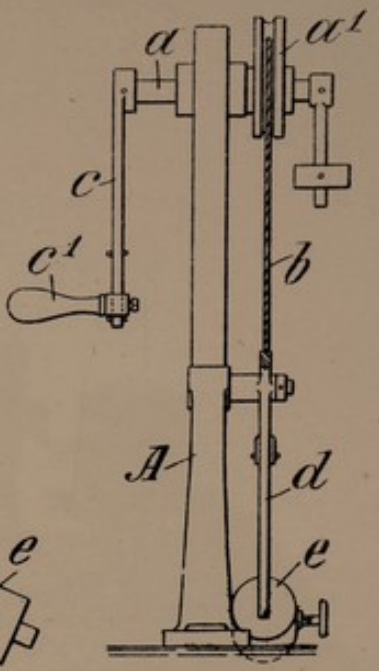


Fig.3

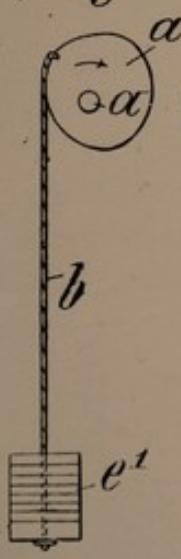


Fig.4

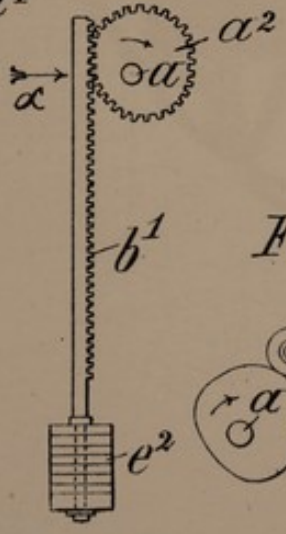


Fig.5

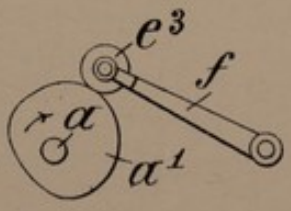
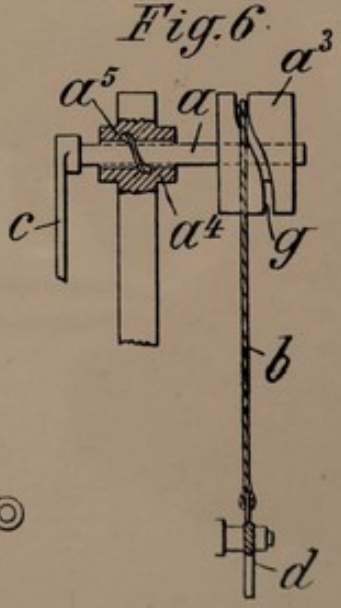


Fig.6



[This Drawing is a reproduction of the Original on a reduced scale.]

Malby & Sons, Photo-Litho.