

Oct. 17, 1967

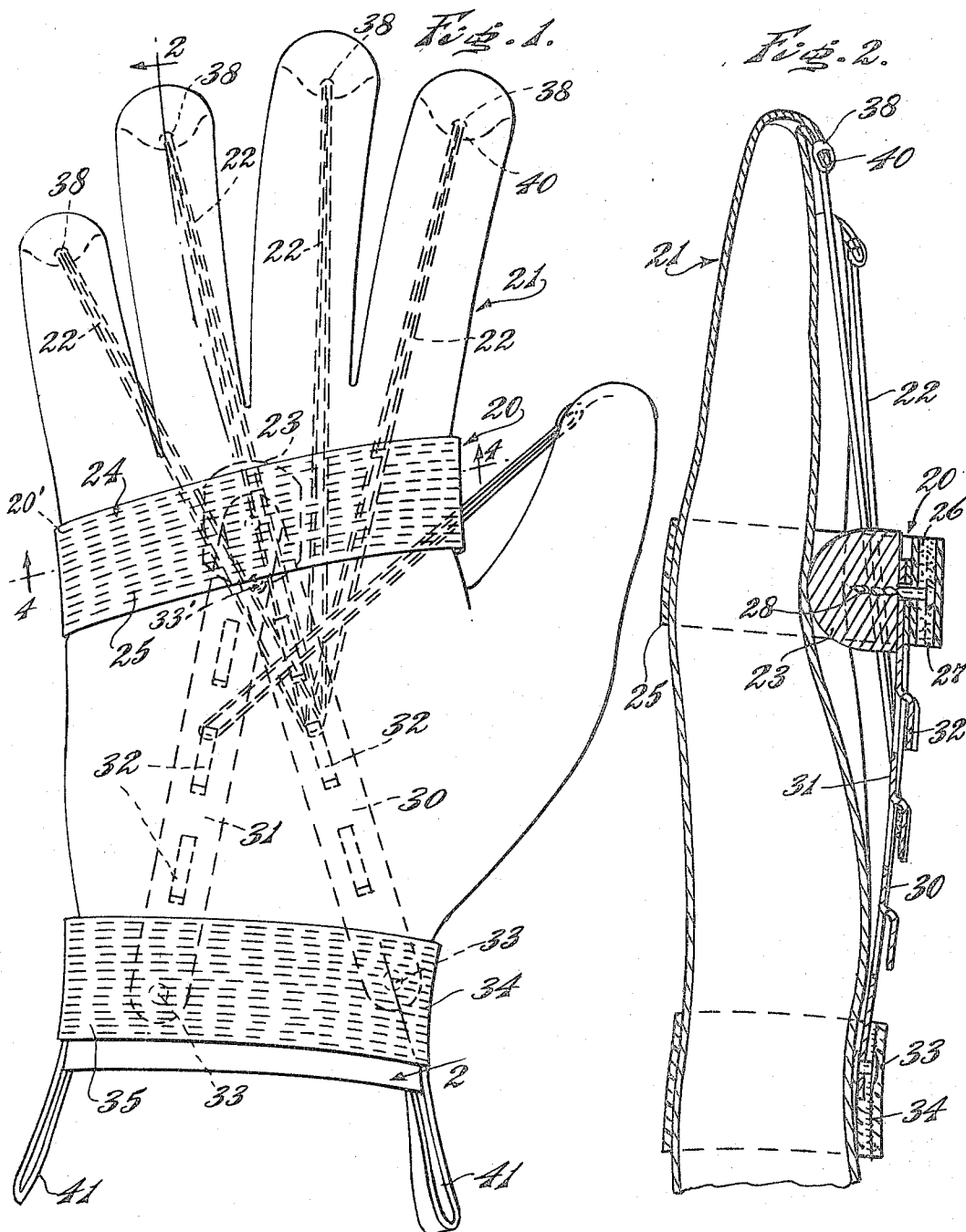
L. P. HYNES

3,347,547

HAND AND FINGER EXERCISING DEVICE

Filed July 28, 1965

3 Sheets-Sheet 1



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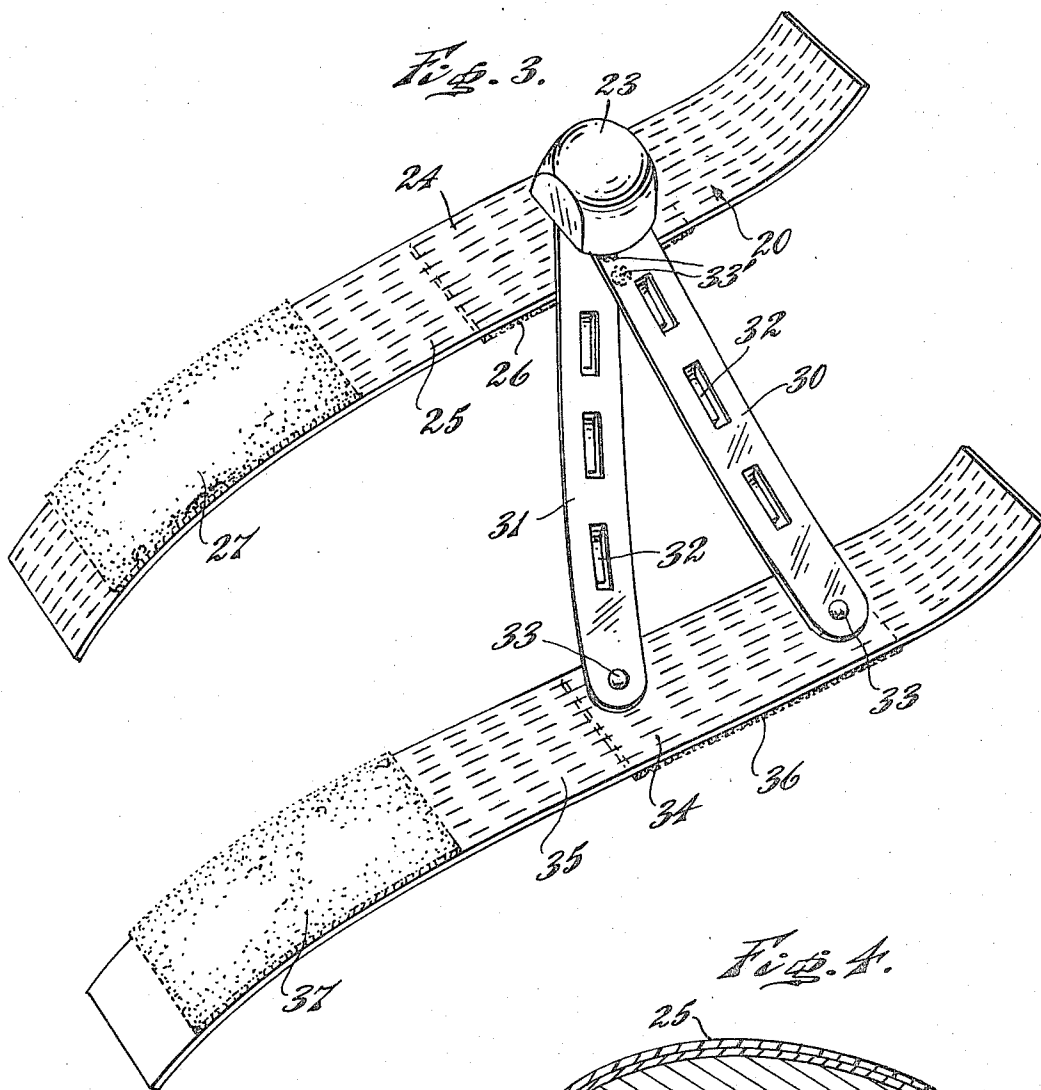
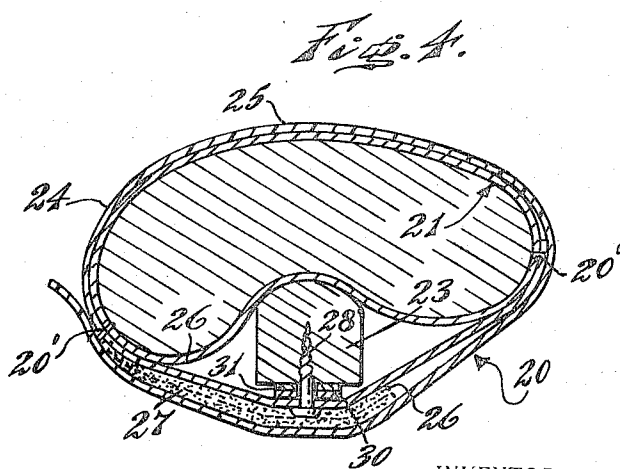
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3 Sheets-Sheet 2



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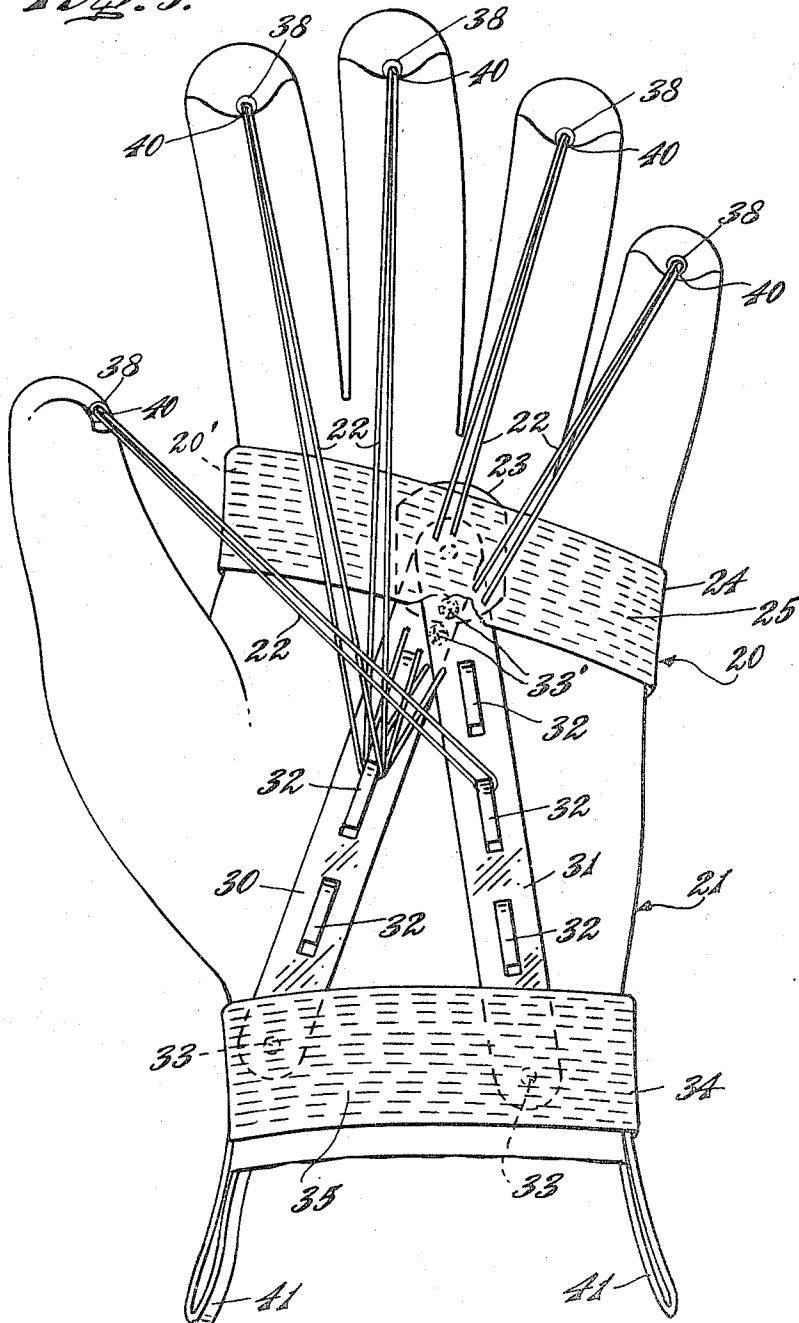
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Fig. 5.



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HAND AND FINGER EXERCISING DEVICE

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5 Claims. (Cl. 272-67)

The present invention relates to hand and finger exercising devices, which for convenience are referred to elsewhere herein as "hand" exercising devices.

The purpose of the invention is to promote correction of physical impairment of the hand, whether from an inherent condition, or disease or injury, by providing exercise in straightening out the fingers and the thumb, each against an individually predetermined resilient bias.

A further purpose is to mount anchorages for resilient biasing devices for the individual fingers and the thumb at the inside of the hand on a bar or bars secured at one end by a fulcrum engaging the center of the palm and secured at the other end by a resilient band around the wrist, so that the whole hand can benefit from the exercise, and not merely the finger joints.

A further purpose is to provide a resilient band for securing the fulcrum adjacent the center of the palm at a point toward the center of the palm from the center of the arch of the hand. The arch of the hand is the joint structure which provides the base for the fingers.

A further purpose is to provide for exercising the arch of the hand against the action of a resilient band surrounding the arch and attached to a fulcrum in the palm of the hand and in connection with exercise of the fingers. The action of the strongly elastic band applies pressure on the fulcrum and at the same time allows the arch of the hand to move and function properly.

In the drawings I have chosen to illustrate one only of the numerous embodiments in which the invention may appear, selecting the form shown from the standpoints of convenience in illustration, satisfactory operation and clear demonstration of the principles involved.

FIGURE 1 is an elevation of the exercising device in the invention, applied on the left hand looking toward the back of the hand.

FIGURE 2 is a section of the device of FIGURE 1 on the line 2-2.

FIGURE 3 is an elevation of the harness open and without the glove, looking at the side which adjoins the palm.

FIGURE 4 is a transverse section through the device of the invention, the section being taken on the line 4-4 of FIGURE 1.

FIGURE 5 is an elevation of the exercising device of the invention, applied to the left hand, looking toward the palm of the hand.

In the prior art extensive use is made of exercising devices for the hand which obtain exercise by closing the hand. In one of these devices the hand is closed on a rubber ball. In British patent to Armstrong, No. 2,559 of 1871, rubber bands are provided connected to various positions along the fingers on one or both sides and connected to a rigid structure anchored to the base of the fingers or to the wrist. In Atkins U.S. Patent 248,980 resilient connections are made to the second joint of the fingers to bias the hand against closing.

I have discovered that great advantage can be obtained by providing an exercising device for the hand in which the fingers and the thumb are biased to close, and therefore open against the resilient bias, the anchorage for the biasing means on the hand including a fulcrum which is located in the center of the palm or toward the center of the palm from the arch of the hand, so that the muscles in the hand and in the fingers and the thumb can be exercised without causing damage or soreness, and making

available the maximum strength of the hand. The rest of the hand, including the palm, participates in the exercise.

An important aspect of the invention is that the fulcrum is firmly held against the center of the palm of the hand by a strong resilient band which surrounds the arch of the hand, and is attached to the fulcrum so that as the exercise progresses, the arch of the hand successively changes its curvature (when viewed from the end of the hand) and manipulates the bases of the fingers. As the hand closes, the arch tends to increase its curvature, and as the hand opens, the arch tends to flatten its curvature against the force of the elastic.

The fulcrum is resiliently urged against the center of the palm, and connected from the fulcrum to the wrist are bars which are resiliently held at the wrist, the bars providing anchorages for the resilient biasing means.

The fulcrum, the bars and the resilient band surrounding the arch of the hand are all interconnected by attachment to the fulcrum.

The device of the invention is useful as an exercising device for people for whom exercise has been prescribed by the physician by reason of arthritis, osteomyelitis and similar diseases. The device of the invention is also useful as a physiotherapy appliance where injuries have occurred to the hand and it is desired to prevent permanent stiffness or malformation as by permanent bending of the fingers.

The device of the invention is also useful in aiding circulation and improving the tone of muscles in the hand.

The device of the invention is also helpful in improving manual dexterity, as in the case of children who have a tendency toward awkwardness and in order to improve the playing of a musical instrument, especially the violin or harp.

The device of the invention is also useful to improve coordination by persons engaged in occupations or avocations requiring superior muscular control and dexterity, for example, golfers, draftsmen, engravers and artists.

The device of the invention can be used in the home or in the hospital or clinic. It is particularly helpful in early stages of conditions which might later cause stiffness of the hand.

Considering the device as shown in FIGURES 1 to 5, it preferably consists of a harness 20, a glove 21 and a series of resilient biasing devices, suitably rubber bands 22.

It will be evident that the harness should be designed or assembled for the right hand or for the left hand, and will be used with a corresponding right hand or left hand glove, as the case may be. While the harness can be used as a separate element from the glove it is preferably attached to the glove as later described.

The glove 21 can suitably be a flexible leather glove, although if heat is applied, particularly by a liquid heating medium such as hot water, it can also be a waterproof glove such as a rubber glove or plastic glove if desired. Instead of a glove, however, the resilient biasing devices can be secured to the ends of the fingers and to the thumb by other means, such as finger stalls or adhesive tape and the harness attached around the palm and the wrist.

A fulcrum 23 suitably of nylon, rubber or other plastic material, although permissibly of wood, is desirably of hemispherical or rounded shape, flattened on the sides as shown, and is placed near the center of the palm of the hand or just toward the center of the palm from the row of joints forming the arch of the hand at the base of the fingers.

The fulcrum is anchored or held in place by a band 24 surrounding the palm of the hand and consisting of elastic rubber tape 25 which will resiliently hug the palm to join at the ends by any suitable means, here

shown as a keeper of rough textile fabric 26 near one end and a suitable counterpart material such as card clothing 27, of which a suitable variant commonly used for removably attaching the open part of women's skirts, is known as Velcro.

Suitably connected as by a screw 28 through the band 24 and extending into the fulcrum 23, there are desirably metallic bars 30 and 31 extending in diverging relation above the palm and the wrist in FIGURE 1. The bars are united as by spot welding at 33'.

Each of the bars 30 and 31 has distributed along its length a series of hooks or anchorage 32 which can be conveniently used to secure one end of each of the tensioning devices or biasing devices to be described.

The bar 31 when mounted on the left hand extends and is slightly bent over the palm toward the wrist adjoining the heel of the hand or the portion opposite the thumb while the bar 30 extends and is slightly bent over the base of the thumb. When mounted on the right hand, they are of course opposite, since the hands are opposite counterparts. Thus the bar 30 is best equipped to anchor the biasing devices 22 extending from the fingers while the bar 31 is most suitable to anchor that extending from the thumb, it being on the opposite side of the hand from the thumb when on the left hand. On the right hand, of course, the relationship is opposite.

Each of the ends of the bars 30 and 31 adjoining the wrist is secured as by rivets 33 to an elastic band 34 extending around the wrist. The band around the wrist has an elastic portion 35, a rough engaging portion or keeper 36 and a card clothing portion 37 which is capable of engaging with the rough keeper portion for attachment to it, serving the function of a buckle, but readily detachable by pulling it directly away as in the familiar engaging device employed in holding women's skirts.

The bars 30 and 31 may be fixed in their extended position by spot welding 33', as best seen in FIGURES 3 and 5.

The bars 30 and 31 thus form rigid, slightly curved bridges between the fulcrum and the wrist supporting the anchorages of the biasing or tensioning devices.

In the preferred embodiment, the harness 20 is united as by sewing to the glove at opposite edges of the elastic band, as shown at 20'.

At the tip of each finger and thumb on the glove is a loop 38 of fabric, metal or plastic which provides an anchorage for the opposite end of the biasing devices. It may be intergral with the glove.

Where rubber bands are used as biasing devices it is convenient to extend one loop end of the rubber band through the anchorage loop 38 and then pull the other loop end through the first end to form an attachment 40.

The tensioning can be regulated by moving the end of the rubber band 22 adjoining the bar 30 or 31 to a nearer or farther hook anchorage 32. It is also desirable to align the rubber bands generally with the central lines of the fingers so as to provide resistance against opening the fingers or the thumb in the normal way.

Heat can be applied either by employing a heating pad surrounding the exercising device or by incorporating one, if desired, into the glove. This aids in promoting circulation. The preferred manner of applying heat, however, is to use warm water and dip the hand in a basin or tub of warm water while exercising. If desired, the glove can be of rubber or other waterproof material to prevent water from penetrating to the hand.

In the operation of the device, the hand is inserted in the glove, as by pulling on loops 41 attached to the glove, if desired. Then the harness is tightened by adjusting the tightness of the elastic band 20 around the palm until the fulcrum is held comfortably tight in the hollow

of the palm near the center, and then attaching the ends of the band. Then the elastic band 34 is wrapped around the wrist making it also comfortably tight and the ends interconnected to hold it in place.

Rubber bands, being already attached to the loops 38 at the ends of the fingers and the thumb of the glove, are now properly tensioned by anchoring their other ends in appropriate selected hook abutments 32. The rubber bands then pull the fingers and the thumb into their closed position when the muscles are relaxed. By pulling the fingers and thumbs out straight, a considerable amount of beneficial exercise is obtained. Starting with a few cycles of exercises, the user as he becomes more accustomed to the exercises will find that he can extend his fingers many times against the resistance of the tensioning devices or biasing devices without excessive fatigue.

If the device is used in connection with a correction of disease or injury, it should be employed under the guidance of a physician, suitably in a clinic or the like, administering physiotherapy, or, where the physician considers it safe, in the home.

In view of my invention and disclosure, variations and modifications to meet individual whim or particular need will doubtless become evident to others skilled in the art, to obtain all or part of the benefits of my invention without copying the structure shown, and I therefore claim all such insofar as they fall within the reasonable spirit and scope of my invention.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a hand exerciser, fulcrum means adapted to engage the palm of the hand of a user, elastic means adapted to surround the hand and to firmly secure the fulcrum against the palm, a band adapted to surround the wrist, rigid bar means interconnecting the fulcrum to the band, first anchorage means adapted to be secured at the end of each of the fingers and to the thumb, second anchorage means secured to said bar means, and separate resilient biasing means extending respectively from the first anchorage means to the second anchorage means for urging each finger and thumb in the direction of bending thereof.

2. The exerciser of claim 1, in which said band is resilient, and said second anchorage means comprises an anchorage for the resilient biasing means connected to the fingers which is positioned to adjoin the center of the hand and an anchorage for the resilient means connected to the thumb positioned to adjoin the heel of the hand.

3. The exerciser of claim 1, in which said band is resilient, and said second anchorage means comprises hook engagements at one side of the hand for the resilient biasing means connected to the fingers and hook engagements on the other side adjoining the heel of the hand for the resilient biasing means connected to the thumb.

4. The exerciser of claim 1, in which the elastic means surrounding the palm resiliently urges the fulcrum toward the palm and in which the second anchorage means comprise a plurality of hook attachments adjoining one side of the hand for the resilient means connected to the fingers, and a plurality of hook attachments on the side adjoining the heel of the hand for the resilient means connected to the thumb.

5. The exerciser of claim 1, in which the first anchorage means comprises a glove and anchoring attachments secured thereon.

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ANTON O. OECHSLE, *Primary Examiner.*