(No Model.)

G. ZANDER.

EXERCISING APPARATUS.

No. 458,382. Patented Aug. 25, 1891.

Fig. 1.

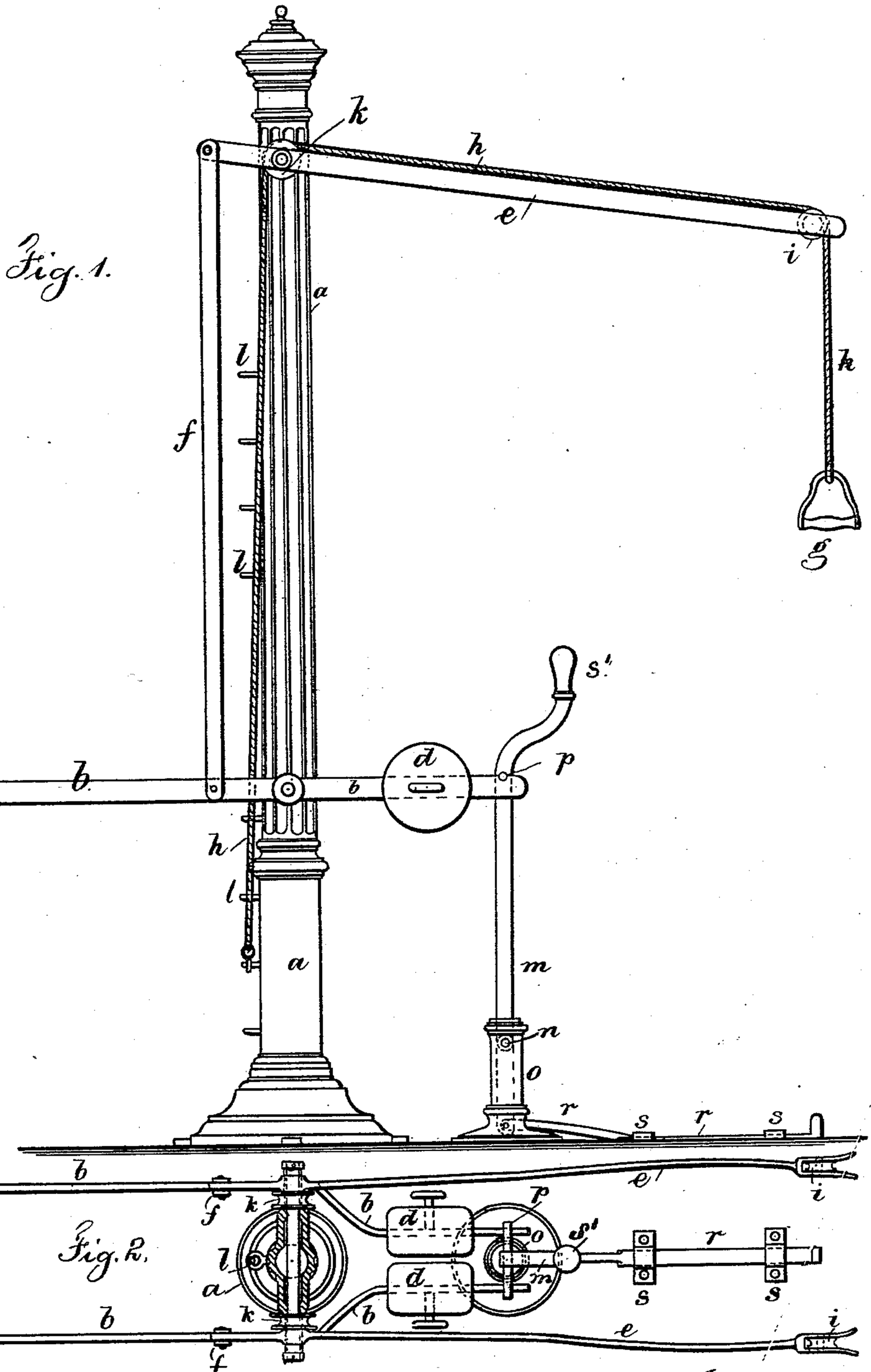

Fig. 2.

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GUSTAF ZANDER, OF STOCKHOLM, SWEDEN.

EXERCISING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 458,382, dated August 25, 1891.

Application filed February 10, 1890. Serial No. 339,817. (No model.)

To all whom it may concern:

Be it known that I, GUSTAF ZANDER, a subject of the King of Sweden, and a resident of Stockholm, Sweden, have invented certain Improvements in Gymnastic Apparatus, of which the following is a specification.

In gymnastic apparatus for exercising the different muscles of a person it is of great importance how the apparatus reacts against the muscular action; and the object of this invention is such an improvement in gymnastic apparatus that the resistance of the apparatus may be regulated in accordance with the variations in the effect of the muscular action. For this purpose the weight to be raised by the muscles is attached to a lever and may be fixed by a set-screw or otherwise more or less distant from the fulcrum to suit the average power of the different set of muscles and of different persons. To ease this shifting of the weight upon the lever the latter is graduated. The most essential feature to gain the purpose mentioned is, however, that the connection between the weighted lever and the handle or handles is such that the weighted lever reaches its horizontal position—that is to say, that the momentum of said lever reaches its greatest value—at the same time as the effect of the muscular power of the limb or part of the body operating the handle or handles reaches its greatest value and increases and decreases at the same time as said muscular power.

In the accompanying drawings is shown an apparatus for exercising different muscles in accordance with the above-named principles.

Figure 1 shows the apparatus in side elevation, and Fig. 2 is a plan partially in section.

a is a support in the form of a column or pillar; *b b*, two graduated and weighted levers pivoted on the pillar. These levers have movable weights *c c* on the longer arms, which weights can easily be fixed by a screw *x* on different places of the levers. There are also other weights *d d*, movable on the short arms of the levers, to partly counterbalance, if necessary, the weights *c c*, in order to suitably adapt them to every variety of muscular strength. Instead of having the weight movable on the lever, the weight may be fixed on the lever and the latter adjustably movable in a socket, which socket is then pivoted.

e e are two overhead levers pivoted on the same pillar *a* and having the shorter arm of the same connected with the long arm of the lever *b* underneath by a connecting-rod *f*.

g g are stirrup-formed handles suspended by straps or cords *h h*, acting on the end of the long arms of the overhead levers *e e*. To be able to easily change the position of the handles *g g*, the straps *h* are not fastened directly to the levers *e*, but are led over pulleys *i* in the outer ends of said levers and over other pulleys *k* on the pillars *a* and from there down the pillars. The pillar *a* is provided with eyebolts *l l* at suitable intervals, and by shifting the hooks in the ends of the straps from one of the eyes to another the position of the handles may be easily changed.

m is a lever pivoted at *n* in a stand *o*, said lever being provided in its upper end with a cross-piece *p*, which is intended to engage with the short ends of the weighted levers *b b* and keep said levers in rest. The lower end of the lever *m* is connected with a bar *r*, movable in guides *s s* on the floor and reaching to the place where the person taking exercise stands. By moving the bent-up end of the bar *r* in or out by the foot after having grasped and pulled down the handles a little in exercising the arms the cross-piece *p* is made to leave or catch the levers *b*. In case the apparatus shall be used for exercising the leg of a person, the cross-piece *p* can be operated by the hands, for which purpose the lever *m* is provided with a handle *s'*.

Before commencing the exercising operation the relative position of the handle or handles and the weighted lever or levers must be regulated according to the principle set forth at the commencement of this specification, or in such a way that the momentum of the weighted lever or levers reaches its greatest value or becomes horizontal at the same time as the muscular power of the part of the body operating the apparatus reaches its greatest value. Thus in exercising the muscles of the arms if the flexor muscles are to be exercised and the weighted levers are kept in their horizontal position the handles must be fixed in such a height that they are at the shoulders of the person taking exercise, or that they can be grasped by him with bent arms and the elbows downward—that is to

say, when the muscle in question has its greatest power. In raising or lowering the arms the weighted levers will sink and rise at the same time, and the muscular power decreases and increases and reaches its greatest value at the same time as the momentum of said levers decreases and increases and reaches its greatest value. If the extensor muscles are to be exercised, the handles must be let down so that the hands of the person taking exercise can grasp them with the arms stretched downward when the weighted levers are in the horizontal position, this for the reason that the extensor muscles have their greatest power in that position. In lifting up and stretching down the hands the power of the extensor muscles decreases and increases and the weighted levers sink and rise at the same time—that is to say, their momentum decreases and increases with the decrease and increase of the muscular power operating them. When the leg is to be exercised, one of the straps, with its handle, is to be let down so low that the foot with the leg stretched can be put into the stirrup-formed handle when the weighted lever is still in its horizontal position. Then the stretching muscles of the legs can be exercised in the same manner as those of the arms, as before described. In this case only one of the weighted levers is used at the time. The straps can also be made to act in an upward or horizontal or any other direction by letting them pass over guiding-pulleys, as before mentioned, so that other leg movements and such movements as flexion and extension of the trunk, &c., in different positions of the body can also be executed. Several appliances for this purpose can be used, and it is evident that by means of these levers with their movable weights a great deal of the muscles of the human body can be exercised and developed in strict accordance with physiological laws.

I wish to make it understood that if such an apparatus should be used by many people it is more convenient to have special apparatus for the different muscles. Then the relative position of the handle or handles and the weighted lever or levers may be fixed once for all if only the stand on which the person taking exercise rests is made adjustable to suit persons of different size, so that the handles always may be grasped or engaged in the proper manner set forth.

I claim as my invention—

1. The combination, in an exercising apparatus, of a weighted lever and a stationary support for the pivot of the same, a second lever and a connection to the weighted lever, a handle, and a flexible connection therefrom to the second lever variable at the place of attachment for raising or lowering the handle for the convenience of the person using the same without changing the relative positions of the levers and weights, substantially as specified.

2. The combination, in an exercising apparatus, of a stationary column or support, the weighted levers *b*, pivoted to the same, the levers *e*, pivoted upon the column, the connections *f* and handles and their flexible connections suspended from the levers *e*, the lever *m*, cross-piece *p*, pivot-stand *o*, and bar *r*, to be acted upon by the foot, substantially as specified.

3. The combination, in an exercising apparatus, with the column *a*, having eyebolts arranged at intervals upon the same, of the levers *e*, the weighted levers *b*, the connections *f*, the handles, and their flexible connections adapted to be engaged with the eyebolts to provide for the varying heights of persons exercising, substantially as specified.

4. The combination, in an exercising apparatus, with the column *a* and its pivotal bearings, of the pair of levers *e*, the pair of weighted levers *b*, the link connections *f* from the short arms of the levers *e* to the long arms of the levers *b*, and a pivoted arm adapted to engage the upper surface of the short arms of the levers *b* to hold the parts in a normal position, substantially as specified.

5. The combination, in an exercising apparatus, with the column *a*, having eyebolts arranged at intervals upon the same, of the levers *e*, the weighted levers *b*, the connections *f*, the handles and their flexible connections adapted to be engaged with the eyebolts, the stand *o*, pivoted lever *m*, and cross-piece *p* to engage the short arm of the weighted lever and maintain the parts in a normal position, whereby while the parts are so engaged and maintained the flexible connections can be shifted to provide for the height of the person using the apparatus, substantially as specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

G. ZANDER.

Witnesses:
NERE A. ELFWING,
FREDRIK L. ENQUIST.