

May 22, 1923.

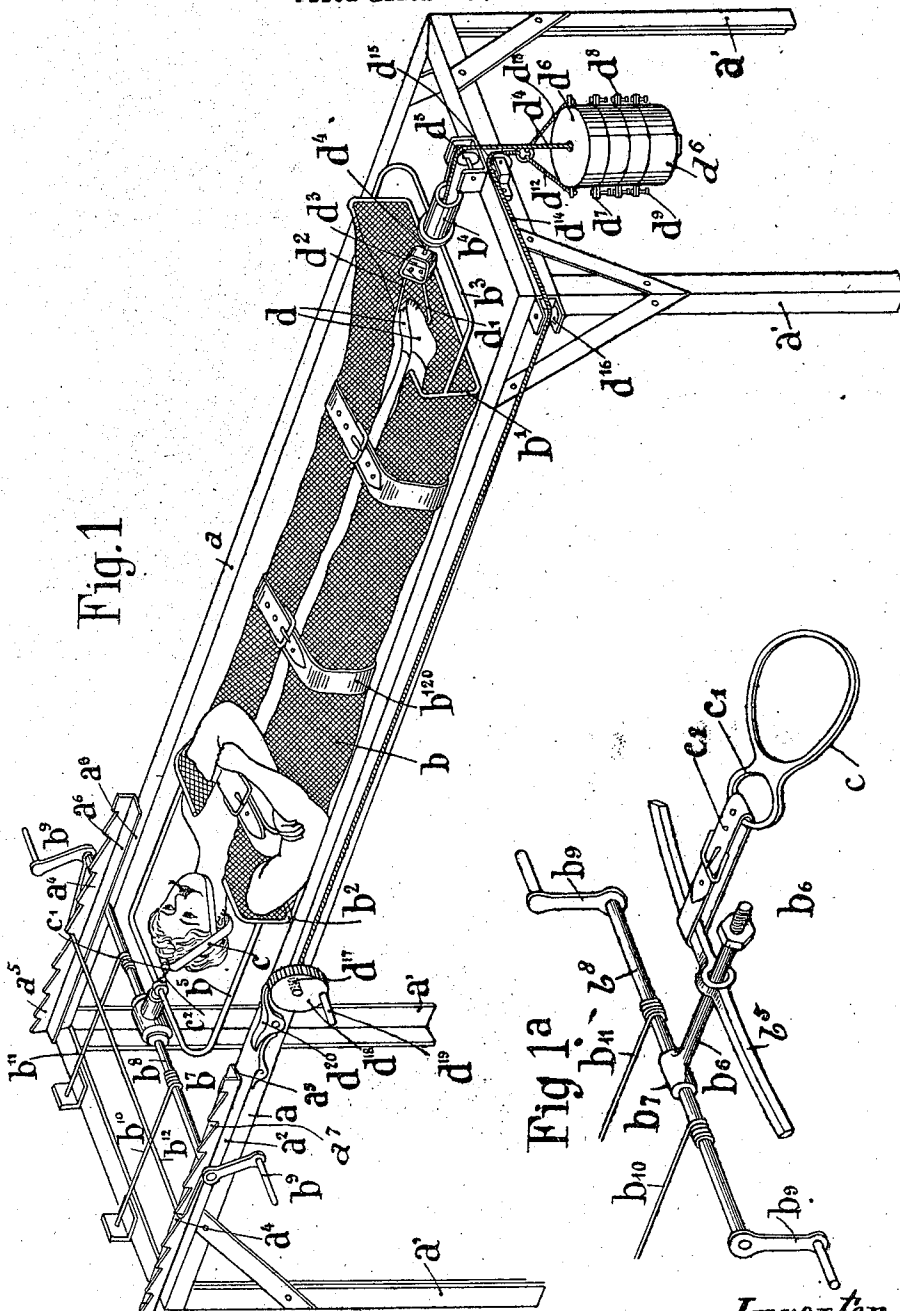
1,456,030

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APPARATUS FOR PHYSICAL CULTURE

Filed March 16, 1921

5 Sheets-Sheet 1



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5 Sheets-Sheet 2

Fig. 2

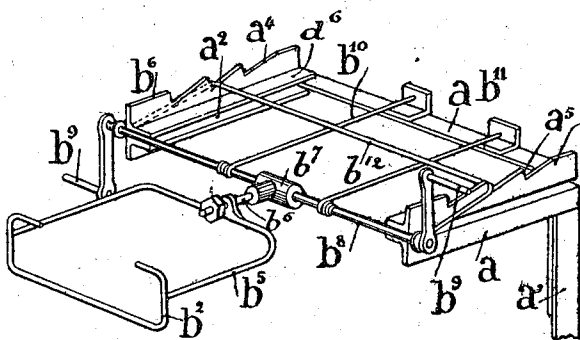


Fig. 3

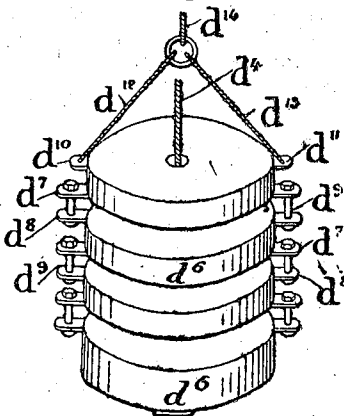
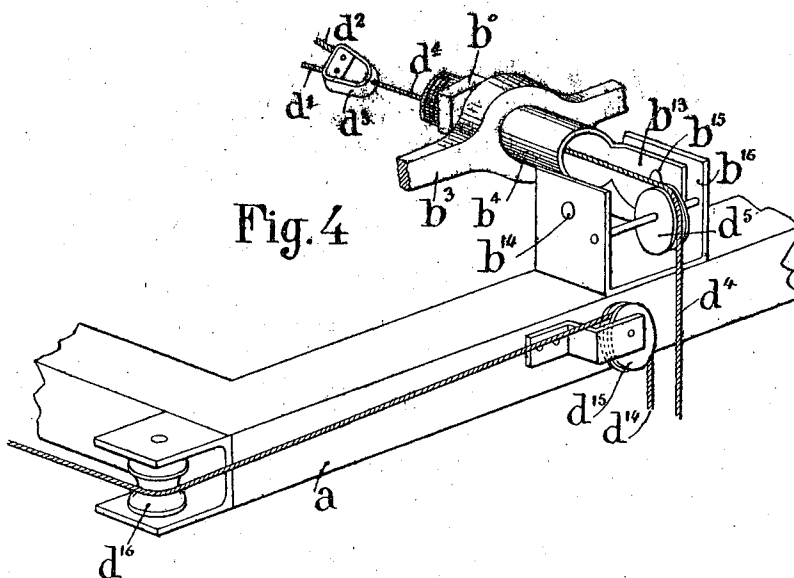


Fig. 4



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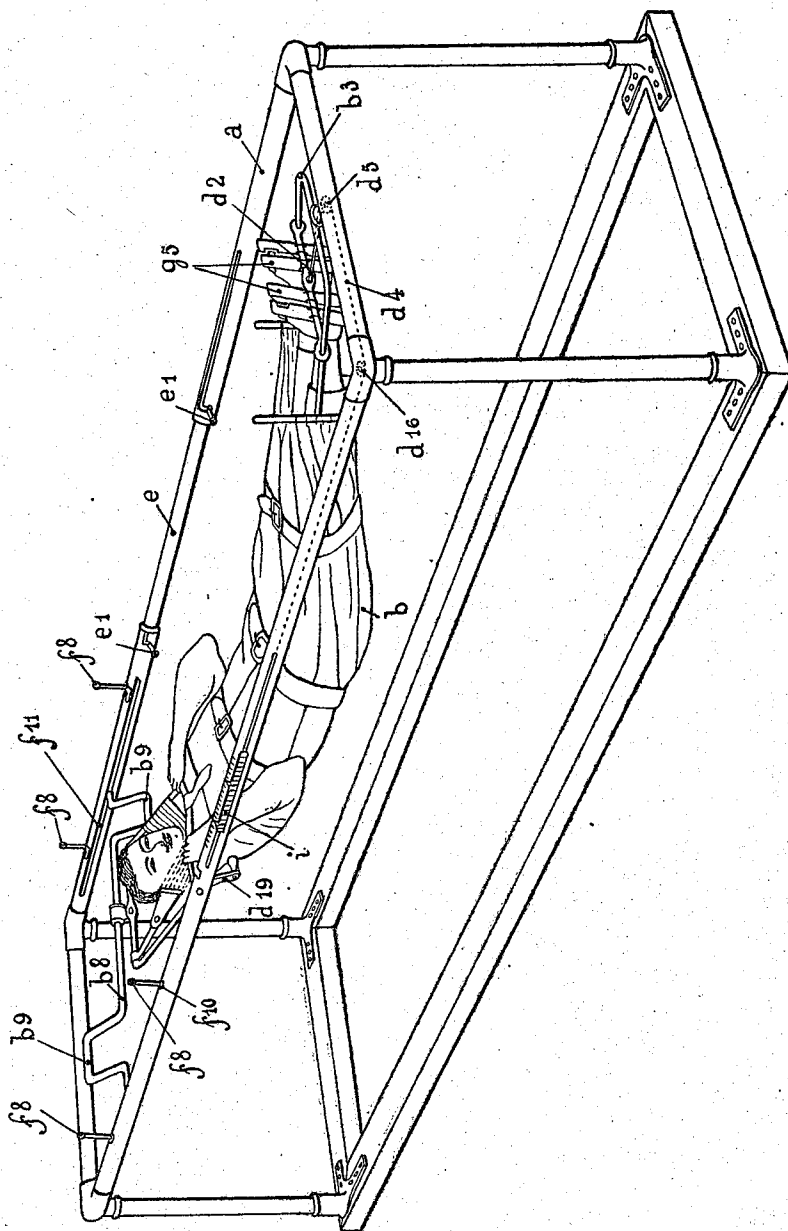
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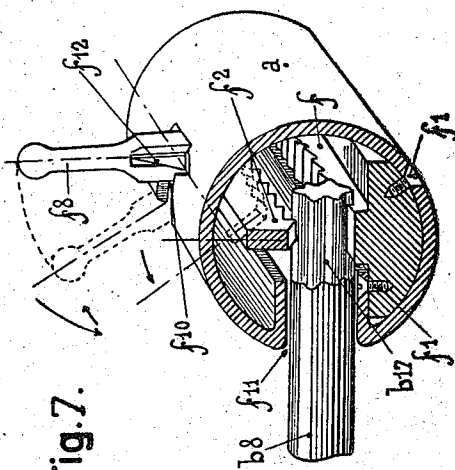
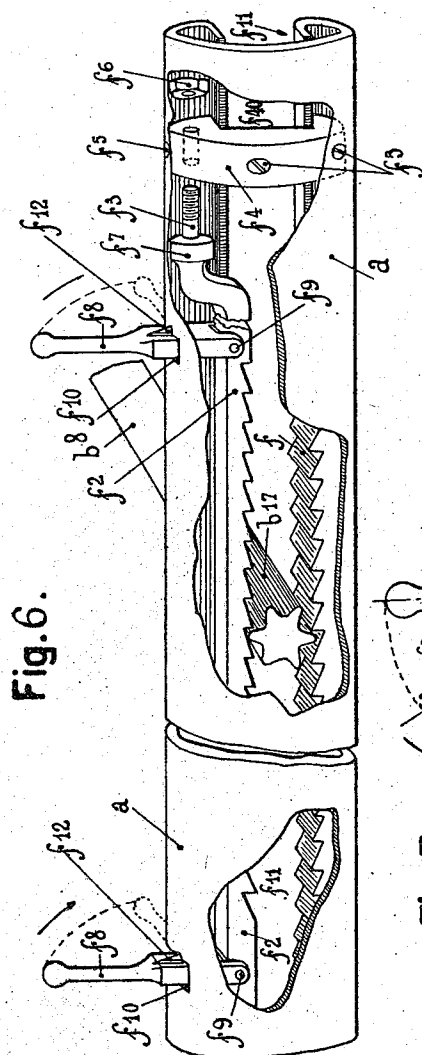
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APPARATUS FOR PHYSICAL CULTURE

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5 Sheets-Sheet 5

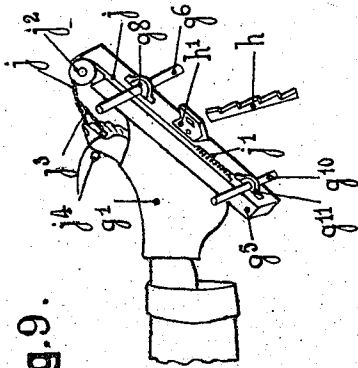


Fig. 9.

Fig. 10.

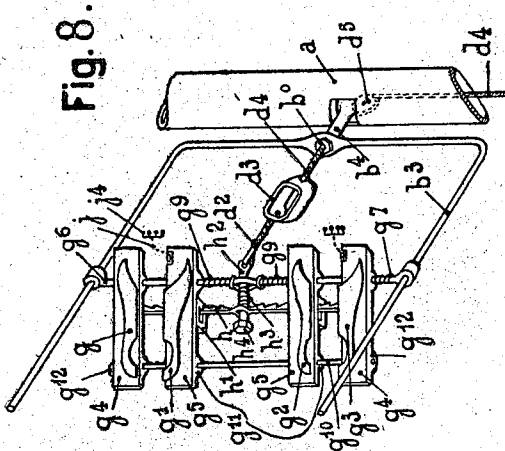
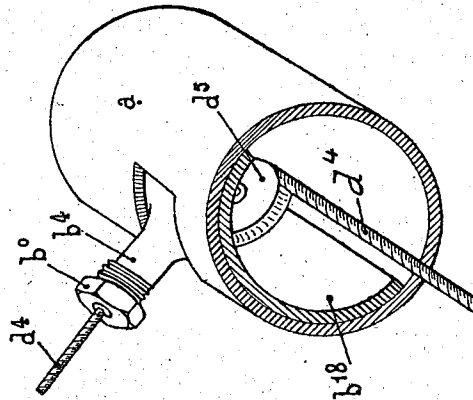


Fig. 8.

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UNITED STATES PATENT OFFICE.

WALTER DAVID MOLBY, OF BALDWIN, KANSAS.

APPARATUS FOR PHYSICAL CULTURE.

Application filed March 16, 1921. Serial No. 452,878.

To all whom it may concern:

Be it known that I, WALTER DAVID MOLBY, a citizen of the United States, residing at Baldwin, Kansas, United States, at present
 5 5 Rue Nouvelle, Paris, France, have invented new and useful Improvements in Apparatus for Physical Culture, of which the following is a specification.

The present invention relates to an apparatus for physical culture which differs essentially from all hitherto designed apparatus in that, firstly, the body of the person undergoing treatment is supported, not upon a fixed bed, but by a kind of rotating hammock for the purpose of submitting the body
 15 to various useful flexions, which cannot be obtained in the case of a fixed bed.

It consists furthermore, in the fact that the body can be submitted to a tension exercised by the help of a weight, which tension makes itself felt from the head to the feet,
 20 and can moreover be adjusted at will by the patient or doctor.

The accompanying drawing shows by way of an example, an apparatus constructed in accordance with the invention.

Figure 1 is a general perspective view.

Figure 1^a shows a detail.

Figure 2, to a larger scale, is a detail view of the device serving to stretch and relax
 30 the hammock.

Figure 3, to a larger scale, shows the weights adjusted by way of example, so as to allow only one of them to act.

Figure 4, to a larger scale, represents the system of cords and associated parts for supporting the weights and for varying the number thereof which it is desired to cause
 35 to act.

Figure 5 is a general view, in perspective, of a modification.

Figures 6 and 7, show details, to a larger scale, of the locking device for the crank shaft.

Figures 8 and 9 show the device for holding the feet and for permitting the muscles of the toes to be exercised.

Figure 10, on the same scale as Figures 6 and 7, is a detail of the mounting of the
 50 guide-pulley over which the cord passes.

Referring first to Figures 1 to 4, the apparatus consists of a frame *a* supported by the legs *a'*. The hammock *b* may be of any suitable type, composed for example of two
 55 metal end-pieces *b'*, *b''* between which is

stretched cloth or other suitable material. An arched support *b³* is connected to the part *b'* and is traversed by a tubular piece *b⁴*. The extremity of this latter is threaded and has a nut *b⁵* thereon. To the part *b²*
 60 is connected an arched support *b⁵* in which is formed an eye through which passes a bolt *b⁶*. The perforated head *b⁷* of this latter is traversed by a shaft *b⁸* mounted in the frame *a* and carrying cranks *b⁹*. On the
 65 shaft *b⁸* are fixed the ends of the cords *b¹⁰*, *b¹¹* connected to the said frame. The ends of the shaft *b⁸* can slide in slots *a²*, *a³* formed in the frame. About said shaft is pivoted a bail *b¹²* which is destined to engage in one
 70 of the teeth *a⁴*, *a⁵* provided in the racks *a⁶*, *a⁷* fixed to the frame.

The head of the patient, which projects beyond the hammock *b*, is supported by a ring *c* having an eyelet *c'* connected by a
 75 strap or other suitable and adjustable means *c²* to the support *b⁵*.

The body of the patient is held in the hammock by any suitable means, such as a lacing or by belts *b¹²⁰*. The feet, which also project,
 80 are or may be shod with slippers *d*, to each of which a cord *d'*, *d²* is connected. These latter are fixed to a ring or swivel *d³* fixed to the end of a cord *d⁴*. This cord
 85 passes through the tube *b⁴* and around a pulley *d⁵* and also through the discs *d⁶*, which constitute the individual weights of any suitable number, in such a manner as to support them. The weights are fitted with
 90 lugs *d⁷*, *d⁸* which are arranged alternately at the lower and upper parts of two adjacent weights. Short bolts *d⁹* pass through the lugs. The uppermost weight is furthermore
 95 provided with ears *d¹⁰*, *d¹¹* to which are connected two cords *d¹²*, *d¹³*; these latter are connected to a cable *d¹⁴* which passes over the guide-pulleys *d¹⁵*, *d¹⁶* and winds up on a shaft *d¹⁷* which carries a ratchet wheel
 100 *d¹⁸* having a handle *d¹⁹*. A spring-pressed pawl *d²⁰* engages the wheel *d¹⁸*.

The tubular part *b⁴* is prolonged to form two lugs, only one of which *b¹³* is shown in Figure 4, these lugs forming bearings for the shafts *b¹⁴*, *b¹⁵* of a bracket *b¹⁶* fixed to the frame *a*.
 105

The method of operation is as follows: To begin with, the weight *d⁶* is raised by operating the handle *d¹⁹*, the effect of which is to wind up the cord on the shaft *d¹⁷* and to raise the said weights by means of the
 110

cords d^{12} , d^{13} . It will be easily understood that it is the first, top weight which is raised, which in turn, by means of the lugs d^7 , d^8 and bolts d^9 , raises the next weight and so on. The weights being all raised, the cord d^4 is slack and it can easily be connected, by means of the cords d^1 , d^2 to the slippers d , d of the patient when he lies down in the hammock.

The hammock b is then stretched so as to give it a substantially horizontal position by imparting a rotary motion to one of the cranks b^9 , the effect of which is to wind up the cords b^{10} , b^{11} about the shaft b^8 and to bring this latter towards the end of the frame a at the same time moving the arched support b^5 , the end piece b^2 , the hammock itself, the end piece b^1 and the arched support b^3 which bears against the nut b^6 . During this operation the shaft b^8 slides in the slots a^2 , a^3 and the bail b^{12} , sliding successively over the teeth a^4 , a^5 of the racks a^6 , a^7 , is held by two of these teeth when the movement is finished so as to hold the hammock in the position to which it has been stretched.

The patient then enters the hammock, attaches his slippers d , d to the cords d^1 , d^2 , then fixes himself in place by straps or lacings b^{120} and then places his head in the ring c so that this ring seizes the nape of the neck of the patient, after which the said ring is attached to the arched support b^5 by means of the connection c^2 .

The patient can now begin to do physical culture exercises. First of all, he disengages the pawl d^{20} from the ratchet d^{18} after having seized the crank d^{19} and he allows the cord d^{14} to unwind until the weights, descending successively, exercise their weight progressively on the cord d^4 . This cord being connected by the cords d^1 , d^2 to the slippers of the patient, the body of this latter, the nape of the neck being held by the ring c , is subjected to tension, the extent of which can be varied at will by the means already explained.

Being thus exposed to the action of this variable tension the patient can make side-wise movements, in one direction or the other of any given amplitude up to as much as a complete revolution. During these movements the majority of his muscles comes into operation including those of the feet and calves. The effort made by the patient can be increased if, instead of giving the hammock a horizontal position as has hitherto been assumed to be the case, its centre is allowed to sink more or less. This result is easily obtained by first releasing the bail b^{12} from the teeth a^4 , a^5 and unwinding to a greater or less extent, by suitable manipulation of the cranks b^9 , the cords b^{10} , b^{11} which are wound round the shaft b^8 .

Finally, it should be pointed out that when the hammock is in a sunken position during

its movement of rotation, the tubular piece b^4 oscillates about the axes b^{14} , b^{15} of the bracket b^{16} .

In the modification shown in Figures 5 to 10, an improvement has been devised which enables the patient to get into and out of the apparatus with greater ease, a second improvement enables the patient to manipulate the apparatus more easily, a third improvement relates to a device by means of which the feet of the patient can be held in a positive manner and finally, a fourth improvement enables the patient also to exercise the muscles of his toes.

The apparatus consists essentially, as in the first example described above, of a suitable frame, but it comprises an entrance for the patient which can be closed by a movable member. This member, which has for example the form of a tube e (Fig. 5) can be raised or lowered by means of a hinge on the frame a , or it can be made to slide so as to enter within this latter; it is held in position by stops e' , e' . The patient has access to the interior of the apparatus by moving the tube e out of the way, without having to stride over the frame as was the case in the modification first described.

In contradistinction to the first modification in which the cranks b^9 , b^9 of the shaft b^8 are exterior of the frame, the cranks according to this modification are interior of the frame so that they are more within the reach of the patient's hands so that the latter can manipulate them himself without the help of a third party. In Fig. 5, the shaft is designated by b^8 and the cranks by b^9 , b^9 . In this case, the arrangement is such that the shaft can be locked in the position to which it has been brought by a mechanism which differs from that described above and consists essentially of a fixed rack f , attached to the interior of the frame a by means of screws f' , f' , Fig. 7, a pinion b^{17} formed at each end of the shaft b^8 and a locking rack f^2 , each off-set extremity of which forms a trunnion f^3 and is mounted in a transverse wall f^4 fixed within the frame a by screws f^5 or in any other suitable manner. To permit of introducing the walls f^4 into the tubes of the frame a , these latter are cut out or notched at f^{40} , Fig. 6. Each trunnion f^3 is held in place by a nut f^6 . Collars f^7 prevent any longitudinal movement of the rack f^2 . To this latter are fixed manipulating handles f^8 , f^8 which are fixed by means of shafts f^9 or in any other suitable manner, the handles passing through openings f^{10} formed in the frame a . A slot f^{11} formed in each of the tubes of the frame a in which are lodged the parts b^{17} , f and f^2 gives every possibility of movement to the crank-shaft b^8 . A spring pin f^{12} of any suitable arrangement permits of locking the handles f^8 in one or the other of their extreme positions.

The method of operation is the following: supposing the patient in position ready to do physical culture and with the parts in the position shown in Fig. 6, the patient first 5 seizes with one hand one of the cranks b^9 so as to hold the shaft b^8 firmly, while at the same time he unlocks with the other hand the rack f^2 on his left, for example by turning the handles f^8, f^9 , the effect of which 10 is to swing the rack which then disengages itself from the pinion b^{17} . He then seizes the other crank b^9 and releases the one he was previously holding, after which he releases, but this time on his right, the other 15 locking rack f^2 which retains the pinion b^{17} at the other end of the shaft b^8 . The handles f^8 are then pushed down and held in position by means of the two spring pins f^{12} . The shaft b^8 being free, the patient seizes the 20 two handles b^9 and can then move the shaft b^8 at will, so as to move it towards or away from his feet, thereby causing relaxing or tensioning of the body of the patient. As soon as the desired tension has been given 25 to the hammock b , the handles f^8 are raised so as to lock the racks f^2 again.

Figures 8 and 9 show the device for holding the feet and enabling the toes to be exercised. This device in so far as it relates 30 to holding the feet, differs from the first described device in that, firstly, the feet are held firmly, they can be introduced into the device and withdrawn therefrom easily and rapidly, and on the other hand, the device is 35 conceived in such a manner that weights for the purpose of tensioning the body of the patient can be dispensed with. It is possible to submit the body to traction without the help of any weight by simply using a cord 40 which is wound on, or unwound from, a drum at the will of the patient.

The feet are introduced each into a kind of clamp consisting essentially of two parts or halves g, g' and g^2, g^3 , of which g^2 are 45 mounted on fixed plates g^4, g^4 and $g' g^3$ on movable plates g^5, g^5 . The plates g^4, g^4 are stationary in so far as they are fixed to a cross-piece g^6 on which they can oscillate without moving laterally, the cross-piece g^6 50 can slide upon the arched support b^3 which is similar to that shown in Figure 1. Springs such as g^7 tend to cause the plates g^4 to assume a suitable inclined position of about 45° with the horizontal. The movable 55 plates g^5, g^5 comprise lugs g^8 through which the cross-piece g^6 passes freely. Springs g^9 tend constantly to force the said movable plates toward the fixed plates g^4, g^4 so as to hold the feet between the two halves 60 g, g' or g^2, g^3 of the foot holder. Parallel to the cross-piece g^6 is arranged a toothed rack h having ratchet teeth which passes freely through retaining pawls constituted by perforated angle-irons fixed to the movable 65 plates g^5, g^5 . At its centre the rack h

is pierced by an eye through which passes a rod h^2 which latter also passes through an eye formed in the centre of the cross-piece g^6 . A spring h^3 serves to hold the rack 70 away from the cross-piece. The said rod h^2 is connected to the traction cord d^2 which is the same as the one already described and is coupled to a swivel d^3 which in turn is connected to the cord d^4 upon which the 75 traction is to be exercised as will be seen below. The rod h^2 is fitted with a head h^4 which bears against the rack h when said traction is exercised. The plates g^4, g^4 and g^5, g^5 which pivot about the cross-piece g^6 are connected and assembled by a rod g^{10} 80 which passes freely through the eyes formed in the lugs g^{11} fixed on the plates, said rod being held against the outer plates by a head g^{12} . It is, however, evident that the said rod could pass through the plates directly; 85 in the same way, the cross-piece g^6 could pass directly through the plates, without the intermediary of the lugs g^8 .

The cord d^4 passes through the tubular part b^4 which, as in the device first described, 90 carries the nut b^6 , the nut in this case bearing against the arched support b^3 . The tubular piece b^4 is in one with a semi-cylindrical support b^{18} inserted in the tube of the frame a and fitted with a roller d^5 over 95 which the cord d^4 passes. In the arrangement shown in Figures 5 to 10 the cord is not connected to a weight as in the previous arrangement, but is connected directly to the crank d^{19} which serves to exercise 100 a traction on the body of the patient. It follows that, instead of exercising a traction by causing the weight d^6 , described above, to act, which was effected by slackening the cord d^{14} , this traction is effected by 105 pulling on the cord, which is effected by acting on the crank.

The degree of traction imparted to the body of the patient can be indicated to the latter by means of a suitable dynamometer 110 *z*. The invention consists in the application of this instrument to apparatus for physical culture.

With reference to Fig. 9, which shows the device enabling the toes of the patient 115 to be exercised, this device consists essentially of an elastic traction-member connected to the toes and allowing these latter to act in antagonism to this member. The said member is shown here in the form of a 120 cord or chain j connected by one of its ends to a spring j' fixed to a suitable point of the sole g^5 and passing over a pulley j^2 and terminating in four small chains j^3 . Each chain terminates in two masses or balls j^4 125 one of which is placed below and the other above each toe, so as to connect the device to the toes of the patient.

The method of operation is as follows: The halves g, g' and g^2, g^3 of the foot- 130

holder being normally close together under the effect of the springs g^9 instead of being apart as shown by way of example in Fig. 8, the patient introduces his feet into the foot-holder by removing the halves from each other, after which the springs g^9 bring the two halves together again, the patient manipulates the crank d^{10} , the effect of which is to pull upon the head h^4 (Fig. 8) through the intermediary of the parts h^2 , d^2 , d^3 , d^4 and to move the rack h until one of its teeth engages the pawl h' and locks the movable halves g^5 , g^5 against the fixed halves g^4 , g^4 . During this operation the spring h^3 is compressed. The feet being firmly held, the patient continues to turn the crank d^{10} , the effect of which is to pull upon the cross-piece g^6 which, sliding upon the arched support b^3 , exercises a traction upon the body.

If, finally, the patient wishes to exercise the muscles of the feet, in general, he introduces the balls j^4 of the chain j^3 between the toes of his feet and exerts an effort the result of which is to exercise the corresponding muscles.

I claim:

1. An apparatus for physical culture, comprising a frame, a pair of coaxially pivoted supports mounted in spaced relation in the frame and adapted to engage the opposite ends of the body of the operator for suspending the same and permitting the turning and twisting of the body on its longitudinal axis by contortions of the body, a flexible cord connected to one of said supports, a bottom weight connected to said cord for placing said support under tension, a plurality of superposed weights on the bottom weight, and means for consecutively relieving the bottom weight of said superposed weights.

2. An apparatus for physical culture comprising a frame, a pair of coaxially and freely pivoted supports in the frame adapted to engage the head and feet of the body of the operator for suspending his body and permitting of the turning and twisting of the body by exercising contortions of the operator, and means for exerting a tension on one support to stretch the body.

3. In an apparatus for physical culture, the combination of a foot support adapted to embrace the foot with the toes free to move, a spring arranged beneath the support, and a flexible connection leading from the spring and about the outer end of the support for engagement with the toes for holding the same under tension against the support.

4. In an apparatus for physical culture, spaced apart supports, and body engaging members freely pivoted in said supports and arranged substantially coaxial and adapted to engage the head and feet of the operator,

for suspending the same whereby when the operator performs exercising contortions the freely pivoted members permit the free turning and twisting of his body.

5. An apparatus for physical culture comprising in combination a frame, a shaft slidably mounted in said frame, a support for the head of the patient connected to said shaft, a cord connected to said frame and wound on said shaft, means operable by the patient for rotating said shaft, a support for the feet of the patient, a flexible support connecting said head and foot-supports, means for applying tension to said foot-support, and means for locking said head-support in position.

6. An apparatus for physical culture comprising in combination a frame, a shaft slidably mounted in said frame, a support for the head of the patient pivotally connected to said shaft, a cord connected to said frame and wound on said shaft, means operable by the patient for rotating said shaft, a rack on said frame, a bail carried by said shaft and adapted to engage said rack, a support for the feet of the patient, a flexible support connecting said head- and foot-supports and means for applying tension to said foot-supports.

7. An apparatus for physical culture comprising in combination a frame, a head-support adjustably connected to said frame, a foot-support, a flexible member connecting said head- and foot-supports, a cord connected to said foot-support, a bottom weight connected to said cord, a plurality of weights superimposed on said bottom weight and connected together in pairs, a cord attached to the topmost weight, a shaft on which said second cord is wound, means for rotating said shaft and means for locking said shaft in position.

8. An apparatus for physical culture comprising in combination a frame, a head-support adjustably connected to said frame, a foot-support, a flexible member connecting said head- and foot-supports, a cord connected to said foot-support, a bottom weight connected to said cord, a plurality of weights superimposed on said bottom weight and connected together in pairs, a cord attached to the topmost weight, a shaft on which said second cord is wound, a ratchet wheel on said shaft, a pawl on said frame engaging said ratchet wheel and means operable by the patient for rotating said shaft.

9. An apparatus for physical culture comprising in combination a frame, a crank-shaft mounted in said frame, a head support connected to said shaft, a foot-support pivotally mounted in said frame, toothed wheels on the ends of said crank-shaft, racks mounted in said frame and means for swinging said racks into and out of engagement with said toothed wheels.

10. An apparatus for physical culture,
comprising in combination a frame, a crank
shaft mounted in said frame and having
cranks interiorly of said frame, a head sup-
5 port connected to said shaft, a foot support
pivotaly mounted in said frame, toothed
wheels on the ends of said crank-shaft, racks
mounted in said frame, means for swinging
said racks into and out of engagement with
10 said toothed wheels and means for locking
said racks in either position.

11. In a device of the class described, the
combination of a foot-support consisting of
fixed and movable halves, springs forcing
said halves together, a cord operable by the 15
patient to exert traction upon said foot-
support, a rack connected to said cord and
adjustably engaging the said movable
halves, said rack being adapted to lock said
fixed and movable halves together under the 20
tension of the cord.

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