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3,377,044 4/1968 Jackson..... 188/1(C)X
 3,409,327 11/1968 Radke..... 188/1(C)X

FOREIGN PATENTS

4,323 1/1901 Czechoslovakia 188/65.5

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[54] **ADJUSTABLE BRAKE APPARATUS FOR FLEXIBLE MATERIAL**
10 Claims, 14 Drawing Figs.

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 182/5, 188/65.5, 272/79

[51] Int. Cl..... **B65h 59/14**

[50] Field of Search..... 188/1(B),
 65.5, 65.4; 272/79, 65.3; 182/5

[56] **References Cited**
UNITED STATES PATENTS

2,528,750 11/1950 Hull..... 272/79
 3,366,353 1/1968 Jackson..... 188/1(C)X

ABSTRACT: An adjustable brake including two or three clamp members with a strip of flexible material, e.g., rope or web belt, having a midportion extending between the clamp members, and being further defined by a closure means operatively connected between the clamp members for selectively urging the clamp members together against the strip of material to thereby increase the frictional forces between the strip of material and the clamp members, said brake being further defined by one or more friction posts positioned between the clamp members, in which case the strip of material may extend at least partway around one or more of said posts such that tension on both ends of the strip of material will urge the material more strongly against the posts thereby increasing the friction between the material and posts.

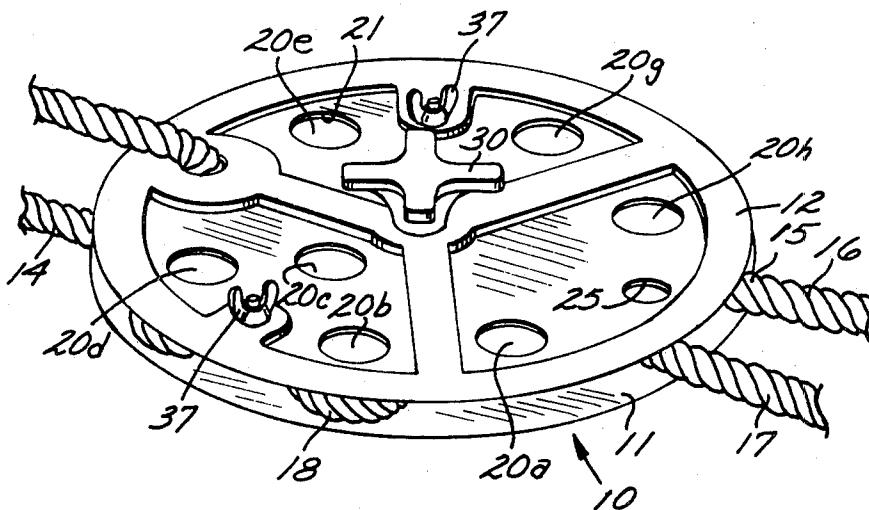


FIG. 1

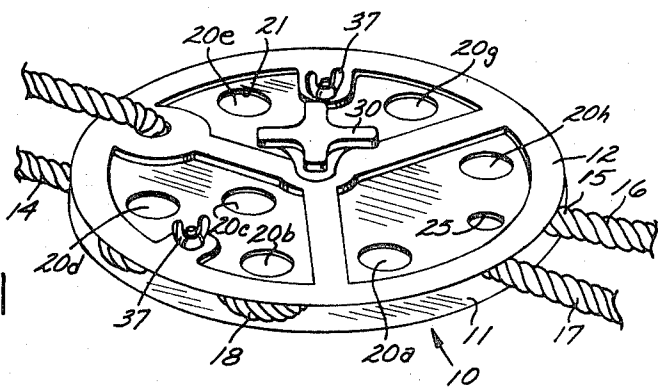


FIG. 2

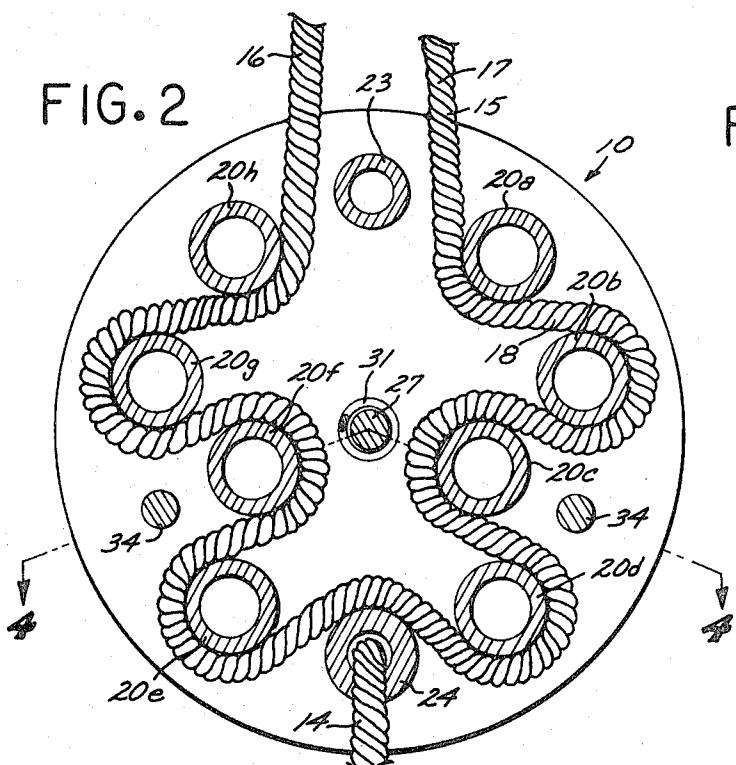


FIG. 3

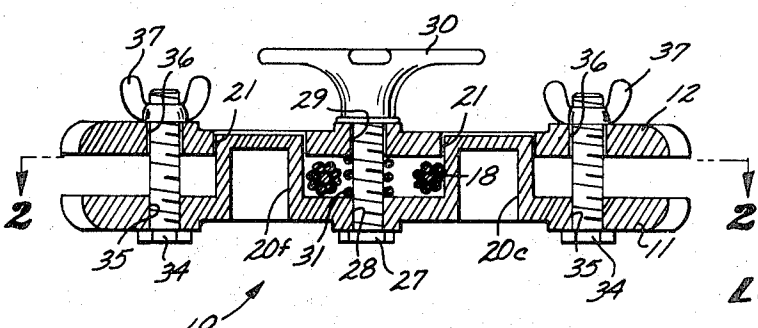
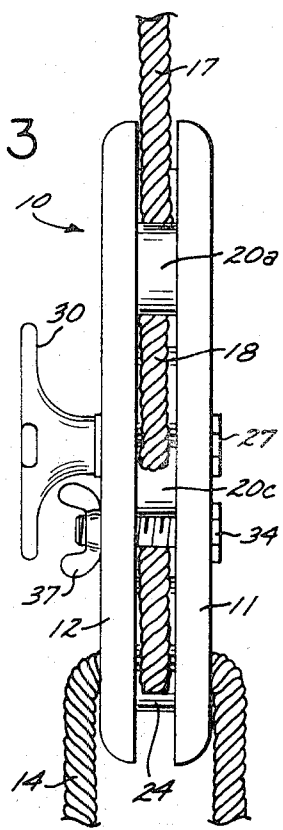


FIG. 4

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FIG. 5

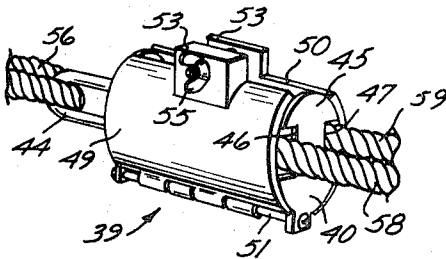


FIG. 7

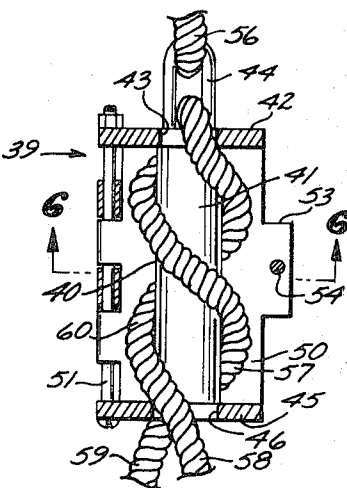


FIG. 6

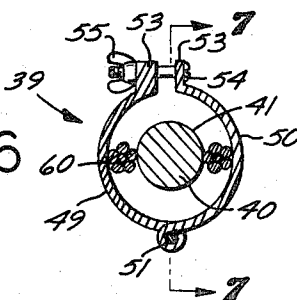


FIG. 8

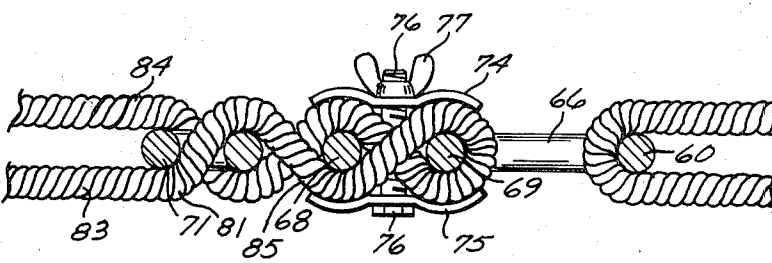
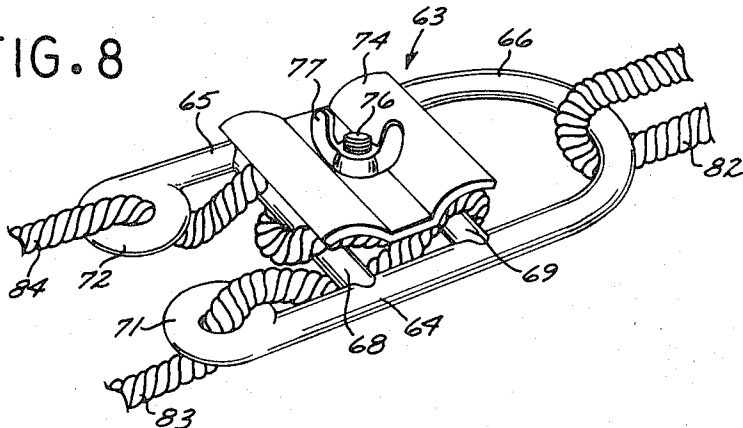


FIG. 9

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FIG. 10

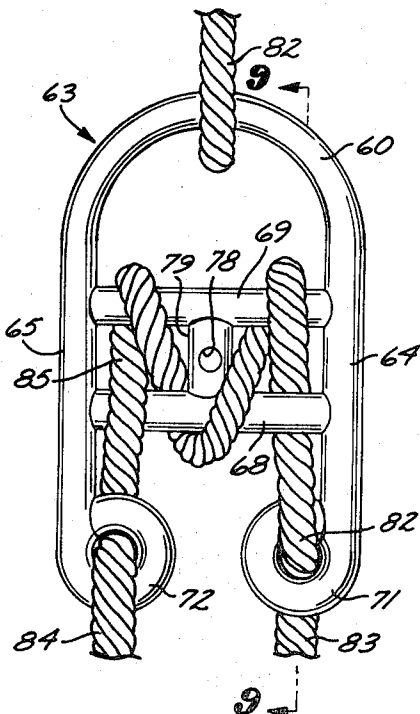


FIG. 11

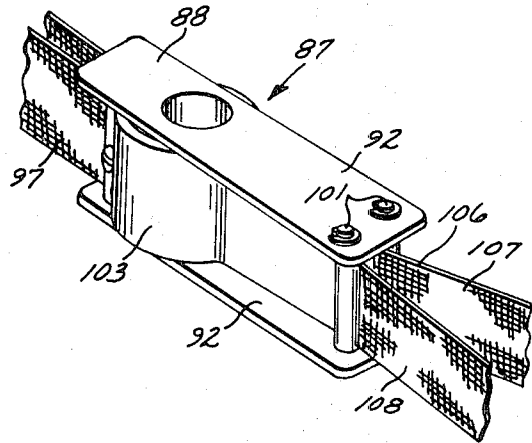


FIG. 12

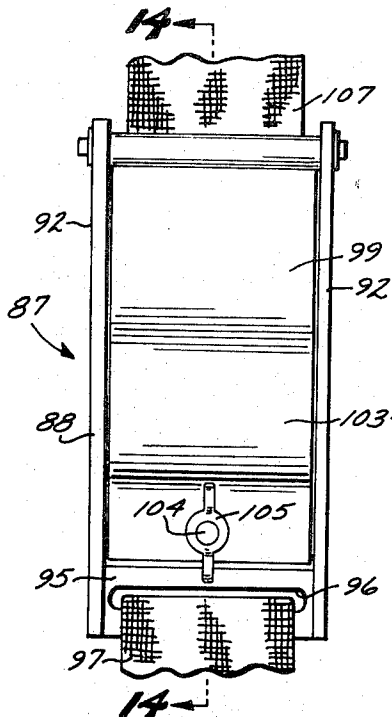


FIG. 13

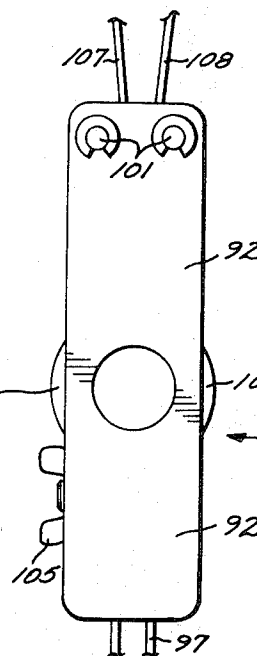
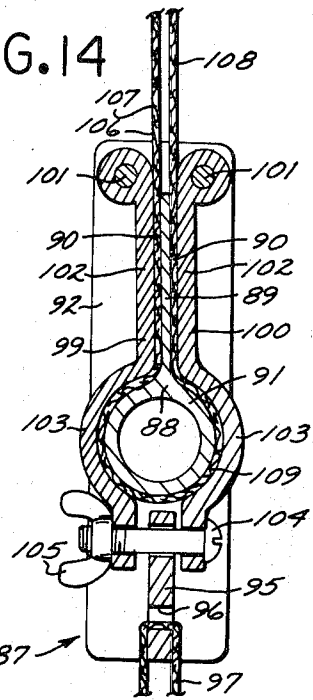


FIG. 14



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ADJUSTABLE BRAKE APPARATUS FOR FLEXIBLE MATERIAL

This invention relates to adjustable brakes, and more particularly to adjustable brakes for breaking the movement of a strip of flexible material through the brake.

Embodiments of the present invention find their widest use in the field of exercising. In such event, the brake is secured to an immovable object and the two ends of the strip of flexible material, *e.g.*, a rope or webbing, extend from the brake to be grasped by the user, who will secure to one of said ends a tow, or pull, bar which he will pull upon to accomplish the exercise desired. Said one end is usually called the pull end and the other end is usually called the tail end. Said tail end, is also held in the person's hand and selectively squeezed against the pull bar as desired.

When used as an exercise device, the person will set the friction of the brake to a desired amount. Then, he will perform the isometric portion of the exercise by squeezing the tail end of the strip of material between the pull bar and his hand, which action, as will be described below, greatly increases the amount of the friction effected by the brake. In this condition, the pull bar does not move relative to the brake, and thus, the isometric portion of the exercise cycle can be accomplished.

After 6 to 10 seconds of such exercise, the person releases the squeezing pressure on the tail end of the material a desired amount in order that the force on the pull bar will cause the strip of material to move through the brake, during which movement, the isotonic portion of the exercise cycle is accomplished.

After the isotonic portion of the exercise is accomplished, it is necessary to pull on the tail end of the strip of material to move the pull bar back to its starting position. In order to reduce the amount of force necessary to accomplish this, the brake must be adjusted to reduce the amount of friction between the rope and the brake. An important facet of the present invention is that brakes incorporating the present invention can be quickly adjusted to require little effort when returning the strip of material to the starting position, and then quickly adjusted to provide a strong frictional force impeding movement of the material through the brake.

This important aspect of the present invention is accomplished by the provision of at least a first and a second clamp member with the strip of flexible material extending between them, and further, providing closure means connected in operative relation with the first and second clamp members for selectively urging the members together against the rope or other strip of material extending between the clamp members. By changing the amount of clamping force urged against the strip of material, the frictional forces effected by the brake are changed.

This is a great advantage over exercise devices such as shown in U.S. Pat. No. 3,197,204 and my copending U.S. Pat. application Ser. No. 661,370 filed Aug. 17, 1967. In each of those devices the increase or decrease of the frictional forces of the brake (other than that effected by pulling on the tail end of the strip of material) could only be accomplished by increasing the number of windings of the material around the friction drum. This increasing and decreasing of the number of windings had to be done in each exercise cycle, which obviously is time consuming. Also, increasing the winding shortens both the pull and the tail ends of the material, which fact makes more difficult the readjusting of the pull end of the material just prior to the exercise cycle. Also, such mechanisms have the disadvantage that—once the resistance is "set", it cannot be reduced except by releasing the lock mechanism, decreasing the windings, and reengaging the lock. With the units of the present invention, the person can very accurately select the amount of frictional forces to be involved by, for example, providing the desired amount of pull on the pull end of the material, and then loosening the means urging the clamp members together until there is movement of the material through the brake.

As another aspect of certain embodiments of the present invention, there is provided a plurality of friction posts on one of

the clamp members. These friction posts are positioned so that the strip of material can be led a tortuous path partway around some, or all of the said friction posts. With this arrangement, tension on the tail end of the strip of material will greatly increase the amount of frictional forces effected by the brake. The use of the plurality of friction posts has the additional advantage that the operator can select the number of posts which he will pass the strip of material around. Thereby, he can select the minimum force which will be needed to move the material through the brake, *i.e.*, when the clamp members are completely loosened and there is tension on only one end of the material. Also, he can thereby vary the effectiveness of tension on the tail end of the strip of material. More particularly, increasing the number of friction post that the strip of material is led around will cause a corresponding increase in the frictional forces effected by the same amount of tension on the tail end of the strip of material.

Although the adjustable brakes according to the present invention are used primarily in exercising, they also find use in such things as mountain climbing. In such case, by way of example, the brake could be secured to the body of the climber with one section of the rope being anchored to the mountain. The brake would be used to control the descent of the climber. Then, after the climber had descended as far as he desired, he would disconnect the anchored section of the rope from the mountain, and loosen the clamp members so that he could freely pull the rope back to the original position. Then, he would re-anchor the section of the rope to the mountain, clamp the clamp members of the brake together to provide the proper amount of frictional braking forces and descend down the rope. He could control the braking force by the amount of pull which he exerts on the nonconnected end of the rope. Also, he could effect control by tightening or loosening the clamp members during descent.

With the foregoing in mind, it is a major object of this invention to provide a new improved adjustable brake for braking the movements of a strip of flexible material through the brake.

Another object of this invention is to provide an adjustable brake which is particularly useful in isometric and isotonic exercising.

A further object of this invention is to provide an adjustable brake having a pair of clamp members and means for clamping the clamp members together on a strip of material extending between the clamp members to thereby apply a selected frictional force on the strip of material passing between the clamp members.

A still further object of this invention is to provide an adjustable friction brake for braking the movement of a strip of flexible material through the brake, which brake has provision for quickly changing the amount of frictional forces applied by the brake to the flexible material.

It is still another object of this invention to provide an improved adjustable brake which may be economically manufactured and easily carried or stored.

It is a further object of this invention to provide an adjustable brake for braking the movement of a strip of flexible material through the brake, which brake has a plurality of friction posts which the material may be led partway around such that tension on the tail end of the strip of material will increase the frictional forces applied by the brake.

It is still another object of this invention to provide an adjustable friction brake for braking the movement of a strip of flexible material through the brake, which brake has means defining a plurality of paths which the strip of flexible material may take through the brake according to the selection of the user.

Other and further objects of this invention will become apparent in the detailed description below in conjunction with the attached drawings wherein:

FIG. 1 is a pictorial view of the first preferred embodiment of the present invention;

FIG. 2 is an enlarged cross-sectional view of the brake in FIG. 1 taken along line 2-2 in FIG. 4;

FIG. 3 is a side view of the brake in FIG. 1, as seen from the right side in FIG. 2;

FIG. 4 is a cross-sectional view of the brake in FIG. 1, taken along line 4-4 in FIG. 2;

FIG. 5 is a pictorial view of a second preferred embodiment of the present invention;

FIG. 6 is a cross-sectional view of the brake in FIG. 5, taken along line 6-6 in FIG. 7;

FIG. 7 is a longitudinal cross-sectional view of the brake in FIG. 5, taken along line 7-7 in FIG. 6;

FIG. 8 is a perspective view of a third preferred embodiment of the present invention;

FIG. 9 is a cross-sectional view of the brake in FIG. 8, taken along line 9-9 in FIG. 10;

FIG. 10 is a plan view of the brake in FIG. 8;

FIG. 11 is a pictorial view of a fourth preferred embodiment of the present invention;

FIG. 12 is a plan view of the brake in FIG. 11;

FIG. 13 is a side view of the brake in FIG. 11; and,

FIG. 14 is a longitudinal cross-sectional view of the brake in FIG. 11, taken along line 14-14 in FIG. 12.

Referring now to FIGS. 1 to 4, the first preferred embodiment of the present invention will be described in further detail.

There is shown a brake, indicated generally by the arrow 10, comprising a first clamp member 11 and a second clamp member 12 disposed in spaced parallel relation in a manner to be described in further detail below. At the left side of the clamp members 11 and 12 (as seen in FIG. 1) there is connected an anchor rope 14 which is secured to some object which is relatively immovable as compared to the brake 10. By way of example, when the brake 10 is used as an exercise device, the anchor rope 14 might be connected to a bar on which stands the person using the brake, or alternatively, the rope 14 might be connected to a hook in the wall. If the device is being used to lower the person in mountain climbing, the anchor rope 14 is used to secure the brake to the person.

The brake 10 is preferably used with rope. Therefore, extending between the clamp members 11 and 12, there is provided a rope 15 with its first and second end sections 16 and 17 respectively, extending from between said clamp members. A midportion 18 is disposed between the clamp members 11 and 12.

For a purpose to be described, there are provided a plurality of friction posts 20a to 20h secured to the clamp member 11 by being integrally cast therewith. The relative positions of the posts 20a to 20h will be discussed further below. In order that these frictions posts 20a to 20h can serve the additional function of indexing the second clamp member 12 relative to the first clamp member 11, there are provided a plurality of openings 21 in the second clamp member at positions to receive therethrough the friction posts.

In addition to the friction posts 20a to 20h, there are provided a first index post 23 and a second index post 24. The index post 23 is received partway through opening 25 in the second clamp member 12 while the index post 24 is received through a comparable opening in said second clamp member.

As the anchor rope 14 is used to anchor the device, and the rope extends through the center hole in the index post 24, this post is sometimes called an anchor post when the clamp members 11 and 12 are clamped against the rope mid-portion 18, this index, or anchor, post 24 extends beyond the second clamp member sufficiently that the pull on the two ends of the bight of the rope 14 will not urge together the adjacent edges of the clamp members 11 and 12.

The device is quite often used in the orientation shown in FIGS. 2 and 3 with the rope ends 16 and 17 extending upwardly and the ends of the rope 14 extending downwardly, and the index post 23 at the top of the device and the index, or anchor, post 24 at the bottom of the device. Therefore, the device and its component parts are sometimes described and claimed herein in the frame of reference shown in FIG. 2. That is, the device has a vertical center line extending vertically through the index posts 23 and 24 and the friction posts 20a to

20d are on the right side of said center line and the friction posts 20e to 20h are on the left side of said center line. Also, it can be seen in FIG. 2 that the friction posts 20a and 20h are higher (as seen in FIG. 2) than the friction posts 20b to 20g and the friction posts 20d and 20e are lower (as seen in FIG. 2) than the friction posts 20a to 20c and 20f to 20h. Therefore, the relative positions of said friction posts 20a to 20h in the vertical direction may be described by calling the friction posts 20a and 20h upper elevation friction posts and the friction posts 20d and 20e lower elevation friction posts and the friction posts 20b, 20c, 20f, and 20g mid-elevation friction posts. It will also be noted that the mid-elevation friction posts 20b and 20g are further away from the above mentioned vertical center line than said upper elevation friction posts 20a and 20h and said lower friction elevation posts 20d and 20e.

It is to be understood that terms such as "vertical position", "vertical center line", "on the right side of the center line", on the "left side of the center line", "left", "right", "downward", "upward", "lower elevation", "mid-elevation" and "upper elevation" in this specification and the appended claims are used solely to facilitate describing and/or claiming the relationship of the components of the device to each other. They are not meant to limit the device to that orientation to horizontal.

For the purpose of pressing or closing the clamp members 11 and 12 together, and thereby effect certain desired frictional braking forces, there is provided closure means operatively connected to said clamp members. By way of example, there is provided to this end a bolt 27 which is secured to the clamp member 11 by being threaded through threaded hole 28 in the center of the first clamp member. The shaft of the bolt 27 extends through a hole 29 in the second clamp member 12 and receives thereon a four-arm nut 30, which can be rotated to press the clamp members together. When the nut 30 is rotated so as to be moved away from the first clamp member 11, a compression spring 31, disposed around the shaft of the bolt 27, resiliently urges the second clamp member 12 away from the first clamp member.

In practice, the four-arm nut 30 can effectuate the desired frictional forces for most situations. However, in certain situations, it is desired that additional closure means be provided at positions spaced away from the center of the clamp members 11 and 12 in order to reduce the rigidity requirement of these clamp members. As an exemplary manner of accomplishing this, the brake 10 includes a pair of bolts 34 which are anchored in the clamp member 11 by being threaded through threaded holes 35. As can be seen, these bolts 34 are disposed near the outer rim of the first and second clamp members 11 and 12. Additionally, it can be seen that the shank of each bolt 34 extends through an appropriately disposed hole 36 in the clamp member 12 and receives a wing nut 37. With the combination of the tightening of the nut 30 and the wing nuts 37, the clamp members 11 and 12 can be urged together with such strength that almost any force on the rope 15 can be successfully resisted—no matter how slippery the rope 15 is. However, when normal braided nylon rope is used, the tightening which can be effected by the nut 30 alone is more than sufficient to accomplish any normally desired frictional forces.

It should be noted that the friction posts 20a through 20h are disposed relative to each other such that the midportion 18 of the rope 15 may be made to follow a rather tortuous path which extends at least partway around each of the friction posts. With the rope midportion 18 extending as shown in FIG. 2, it can be seen that tension on both ends 16 and 17 of the rope 15 causes the various portions of the midportion 18 to engage more firmly the friction posts 20a to 20h. This is an important facet of the present invention as will now be pointed out in more detail. One end section, e.g., section 16 of the rope 15 is connected or secured to a pull bar (not shown), while the other end section 17 of the rope is disposed in position where the person can clamp the said tail end section against the pull bar with the use of one or more of his fingers. When the person is doing the isometric portion of the exercise

he desires that the rope will not move through the brake 10 as a result of the pull on the pull bar. To prevent this, he will apply tension on the tail end of the rope, which tension is accomplished by squeezing the tail end section 17 of the rope between the person's hand and the pull bar. A very small amount of tension on the tail end section 17 of the rope will accomplish a very large amount of frictional forces resisting force on the pull end of the rope. Then, when the isotonic portion of the exercise is to be accomplished, the person reduces the tension on the tail end section 17 of the rope 15 slightly in order to permit the desired rate of movement of the rope through the brake 10.

With the rope midportion 18 following the path disclosed in FIG. 2, there is a maximum use being made of the friction posts 20a to 20h. The braking effect on the rope 15 is operating in a range which is dependent upon the amount of pressure clamping the rope midportion 18 between the clamp members 11 and 12, and the amount of tension on the tail end section 17 of the rope. An important aspect of the present invention, is that the path around the friction posts can be changed to permit the friction brake 10 to have a different range of operation.

For example, the rope 15 could extend from the end section 17 around the friction post 20a, and thence around the friction post 20h, and thence back upwardly (as seen in FIG. 2). Assuming that the same forces were applied to the two ends 16 and 17 of the rope 15, the frictional forces applied by the brake 10 in the last mentioned situation would be greatly less than the frictional forces which would be applied if the rope midportion 18 took the tortuous path disclosed in FIG. 2. And, as is obvious, there are many different paths which the rope midportion 18 could take to effect different desired amounts of braking power.

By way of example, if a man were using the brake 10 for exercise purposes, he may desire to have the rope midportion 18 follow the path disclosed in FIG. 2. For his individual exercises, he would loosen the nut 30, and return the rope 15 to the position where the pull bar (connected by way of example, to the end section 16) is close to the brake 10. Then, he tightens the nut 30 to the desired point and commences his exercise. At such time as he has completed the isotonic portion of the exercise, the nut 30 is again loosened and the tail end of the rope (end section 17 in the example) would be pulled upon in order to return the pull bar to the starting position. If a woman were using the brake 10, the exercise procedure would be the same except that the rope might merely extend, by way of example, partway around the friction post 20a and then partway around the friction post 20b, and thence across over to the friction post 20g, and then, after passing partway around said friction post 20g extend partway around the friction post 20h and upwardly (as seen in FIG. 2). Although, in this latter case, the braking power of the brake 10 is greatly less than in the first case, it has the advantage that it takes significantly less power to return the rope 15 to the starting position. In other words, even when the nut 30 is in the position shown in FIG. 3, the friction between the rope midportion 18 and the friction posts 20a to 20h is note worthy because of the tortuous path of the rope. This may make it somewhat difficult for a woman to return the rope 15 to the starting position. On the other hand, if the rope only took the simpler path above described, there would be significantly less force needed to return the rope 15 to the starting position.

As indicated above, the rope midportion 18 may take different paths around the various ones of said friction posts 20a to 20h according to the amount of braking forces desired. However, it should be noted that in each of the exemplary cases, the rope midportion 18 extends between the clamp members 11 and 12 on one side of the above vertical center line, e.g., the left side, from which point the rope extends downward toward the bottom of the clamp members where the rope crosses said center line and then extends upwardly exiting from between the two clamp members on the other side of said vertical center line, e.g., the right side, and further,

that the rope midportion extends at least partway around one of the anchor post 24 and said friction posts 20a to 20h.

Referring now to FIGS. 5 to 7, the second preferred embodiment of the present invention will be described. In this case, an adjustable brake, indicated generally by the arrow 39, comprises a first clamp member 40 having an elongated body having a first and a second end with an outwardly facing cylindrical surface 41 extending between said ends. A radial flange 42, at one end of said surface 41 is provided with a pair of notches, or openings, 43 therethrough, and has an attachment ring 44 disposed at the center thereof. Additionally, there is provided at the second end of the clamp member 40 a radial flange 45 which has first and second notches, or openings, 46 and 47 respectively, extending therethrough.

The brake 39 is fixed to a relatively immovable object by an anchor rope 56 extending through the ring 44.

In order to provide means for varying the frictional forces applied to the strip of material in the manner to be described, the brake 39 also includes second and third clamp members 49 and 50 respectively, which are swingably secured to the first clamp member 40 by means of an axle 51. These clamp members 49 and 50 are each shaped with an inwardly facing cylindrical surface extending substantially the length of the cylindrical surface 41. Additionally, at the side of each clamp member 49 and 50 opposite the axle 51, there is provided a flange 53 through which extends a bolt 54. Said bolt 54 receives a wing nut 55 for the purpose of selectively closing the second and third clamp members 49 and 50 toward said first clamp member 40.

As in the first embodiment, the strip of material which is to be moved through the brake is preferably a rope such as rope 57. The rope 57 has first and second end sections 58 and 59 respectively, which are joined by a midportion 60. In this case, it will be noted that the midportion 60 of the rope 59 extends around the cylindrical surface 41 in a helical fashion. Similarly to the brake 10, the brake 39 can change the useful operating range of the brake by changing the amount of rope 57 in contact with the friction surfaces of the brake. In the brake 39, this is accomplished by changing the number of turns of the rope on the cylindrical surface 41 (which is effectively part of a friction post). Additionally, it can be seen that, if a pull bar were hooked to, for example, end section 58, the frictional forces between the rope 57 and the cylindrical surface 41, as well as, between the rope and the surface between the openings 43, can be increased by applying tension on the tail rope (end section 59 in the example).

To change the number of turns of the rope 57, the wing nut 55 is removed to permit the second and third clamp members to be swung outwardly. The rope 57 is extended through the attachment ring 44, and then the rope is twisted around the cylindrical surface 41 the desired number of times before being led away from the first clamp member 40 through the openings 46 and 47. Then the user will swing the second and third clamp members 49 and 50 back together again and hold them there loosely encircling the rope midportion 60. At that time, the tail end of the rope, e.g., second end section 59, is pulled until the end section 58 (which would be the pull end in the example) is moved near the brake 39. Then, the wing nut 53 is rotated to tighten or close the second and third clamp members 49 and 50 toward each other—clamping the rope midportion 60 against the cylindrical surface 41 of the first clamp member 40. At that time, the isometric portion of the exercise is accomplished in the manner described in connection with the first embodiment. Then, the isotonic portion of the exercise is accomplished in the same manner as described in relation to the brake 10. After that, the wing nut 55 is loosened to permit the rope 57 to be returned easily to the starting condition as related to the brake 39.

In the second embodiment of the present invention, the rope 57 is extending helically around the first clamp member 40, and the squeezing of the rope 57 is accomplished by pulling together the second and third clamp members 49 and 50 which are disposed around the first clamp member 40. A

similar approach to the problem would be to provide a cylindrical clamp member with an inward facing cylindrical surface, and provide an expandable mandrel to be received through the center of the cylinder clamp member, and further provide a rope extending as the rope 57 extends around the brake 39. However, the disclosed embodiment of the invention is cheaper, more reliable, and more compact than the just described embodiment of the present invention.

Referring now to FIGS. 8 to 10, a third preferred embodiment of the present invention will not be described. The brake in this case comprises a generally U-shaped first clamp member 63 having a first leg 64 and a second leg 65 extending generally parallel from a curved joiner section 66. In this case, the curved joiner section 66 functions the same as the anchor, or attachment ring, 44 of the brake 39.

For the same purposes as friction posts 20a to 20h, the clamp member 63 is provided with first and second friction posts, 68 and 69 respectively, extending between the legs 64 and 65 of the clamp member. Additionally, the first clamp member 63 is characterized by a first guide ring 71 at the free end of the first leg 64, and a second guide ring 72 at the free end of the second leg 65. These guide rings are used in the manner to be described.

As in the case of the first embodiment, it is desired that means be provided for selectively, accurately increasing the frictional forces between the brake and the strip of flexible material being passed through the brake. To this end, there is provided second and third clamp members 74 and 75 respectively, disposed on opposite sides of the center portion of the first clamp member 63. For purposes of closing the clamp members together to clamp any material between them, there is provided a bolt 76 having at its free end a wing nut 77 which can be tightened to close onto the strip of material being used with the brake. The bolt 76 locates the clamp members 74 and 75 relative to the clamp member 63 as the said bolt extends through an index hole 78 in joiner section 79 which extends between the two friction posts 68 and 69.

With the third embodiment of the invention, it is preferred that the strip of material be a rope such as rope 81, which has a first end section 83 and a second end section 84 joined by a midportion 85. As with the previously described embodiments, the rope may be twisted rope or braided rope.

As shown in the drawings, the rope midportion 85 is extended to make the maximum use of the friction posts 68 and 69. More particularly, as seen in FIG. 10, the rope midportion 85 extends upward through the guide ring 71 and thence down under the first friction post 68, and then up over and around and under the second friction post 69 before returning to the upper side of the friction post 68, from which position it extends around and under said last mentioned friction post before extending up between the two friction posts and around the second friction post again. From this last mentioned position, the rope midportion 85 extends back up between the first and second friction post 68 and 69, over the top of the first friction post, and thence down to a position from which it extends up through the second guide ring 72. As in the prior embodiments, it can be seen that tension on the tail end of the rope 82, e.g., second end section 84, would greatly increase the frictional forces of the clamp member 63 resisting any pulling forces on the first end section 83 (which in the example given would be the pull end of the rope).

If it is desired that there be less friction in the brake—independent of the pressure of the second and third clamp members 74 and 75—the rope midportion 85 might be extended merely as follows—by way of example only. Referring again to the brake as seen in FIG. 10, the rope midportion 85 could extend up through the guide ring 71, and thence down under the first friction post 68, and thence up over and around the second friction post 69, and thence back up between the two friction posts before extending to a position below the second guide ring 72 from which it extends up through said last mentioned guide ring.

The use of this third embodiment of the invention is substantially the same as the first two brakes, and accordingly, will not be described again.

Referring now to FIGS. 11 to 14, the fourth embodiment of the present invention will be described. There is shown a brake, indicated generally by the arrow 87, which brake differs from the others in that, among other things, it is particularly useful for braking the movement through it of a strip of material which is relatively thin and wide, e.g., a web of material such as a web belt. Additionally, in the brake 87, the clamp members are hingedly secured together in a somewhat different position than in the case of the brake 39.

The brake 87 comprises an elongated first clamp member 88 which has a first and second end. Near said second end there is a longitudinal flange, or plate, 89 which furnishes oppositely facing pressure, or friction, surfaces 90. Nearer the first end of the clamp member 88 there is provided an enlarged cylindrical portion 91, which—as will be apparent in the description below in connection with the drawings—functions as a friction post in this brake 87. Said enlarged cylindrical portion 91 also functions to permit a smoother movement of the web of material passed the cylindrical portion. The flange 89 can be made as two separate flanges spaced apart a distance equal to the diameter of the cylindrical portion 91, however, the structure shown in preferred in order to reduce costs of manufacture and weight.

Extending along the two opposite sides of the clamp member 88 are side plates 92 which can be integrally cast with the flange 89 and the cylindrical portion 91. At the first end of the clamp member 88 there is provided a cross bar 95 having a slot 96 therein for receiving an anchor belt 97. The belt 97 is to be connected to any object which is to be immovable as compared to the brake 87.

Disposed on opposite sides of the first clamp member 88, there are provided second and third clamp members 99 and 100 respectively. The second and third clamp members 99 and 100 are each swingably secured to the first clamp member. Preferably, this is accomplished in each case by an axle 101 extending through the flanges 92 and the end of the respective second or third clamp member 99 or 100. The axle can be removably secured in that position by use of, for example, snap rings as shown.

Each of the second and third clamp members, 99 and 100, is shaped complementarily with the friction surfaces of the first clamp member 88. Therefore, each of the clamp members 99 and 100 has a flat section 102 disposed to be swung into apposition with the flange 89. Similarly, each of the clamp members 99 and 100 have a curved section 103, with an inward friction surface shaped as will be explained below.

For purposes of closing the second and third clamp members 99 and 100 together, there is provided a bolt 104 extending through a hole in each of the third clamp member 100, the cross bar 95, and the second clamp member 99. Then, by use of a wing nut 105, for example, the second and third clamp members 99 and 100 may be selectively urged toward the first clamp member 88.

As mentioned previously, the brake 87 is preferably used with a web which is relatively wide as compared to its thickness. By way of example, there could be used a woven belt, such as the belt 106. This belt 106 has a first end section 107 and a second end section 108 joined by a midportion 109. As can be seen best in FIG. 14, the belt midportion 109 extends from the first end section 107 along one face of the plate 89, and thence around the cylindrical portion 91, and thence along the opposite side of the flange 89. Thereby, tightening of the wing nut 105 will cause the second and third clamp members 99 and 100 to press the belt midportion 109 against the surfaces 90 of the flange 89 and the cylindrical surface afforded by the cylindrical portion 91. As can be seen, the curved section 103 of the second and third clamp members 99 and 100 are each shaped to present a cylindrical inner surface having a radius generally equal to the distance of the radius of the cylindrical section 91 plus the thickness of the belt 106.

The use of the brake 87 is substantially the same as the prior embodiments, and therefore, will not be described again.

While only a few embodiments of the present invention have been shown and described in detail, it will be apparent to those skilled in the art that such is by way of illustration only, and numerous changes can be made without departing from the spirit of the present invention. For example, the use of the third clamp member in the second, third and fourth preferred embodiments is preferred as it reduces the overall required size of the brake, and is more efficient—among other things—however, the third clamp member could be eliminated and still have a brake which would operate.

I claim:

1. An adjustable brake for braking the movement of a strip of flexible material through the brake, said brake comprising:
 - a first and a second clamp members juxtaposed to each other in a vertical position;
 - a plurality of holes in said second member;
 - a plurality of friction posts integral with said first member, each friction post extending through a respective hole in said second member;
 - an anchor post at the bottom of said first member extending through a hole in said second member and beyond said second member, said anchor post having an axial hole therethrough;
 - a strip of flexible material having a first end and a second end joined by a midportion, said midportion extending between said first and second members;
 - closure means connected in operative relation with said first and second clamp members for selectively urging said members together against said strip of material; and
 - an anchor rope having a midportion extending through said axial hole in said anchor post and two end sections extending downward on the outer sides of said members, whereby a downward pull on said two ends of the anchor rope will not tend to pull the two members together.
2. An adjustable brake for braking the movement of a strip of flexible material through the brake, said brake comprising:
 - a first and a second clamp member juxtaposed to each other in a vertical position with the members each having a predetermined width extending to the right and left of a vertical center line on each of said members;
 - said second member having a plurality of holes therethrough, at least one of said holes being on the left of said center line on the second member and at least one of said holes being on the right side of said center line on the second member;
 - said first member having a plurality of friction posts thereon each extending through a respective hole on said second member, at least one friction post being on the left side of said center line of the first member and at least one friction post being on the right side of said center line on the first member;
 - anchor means at the bottom of said members for operatively connecting to said members an anchor rope which can be fixed to some relatively stationary object;
 - a strip of flexible material having a first and a second end joined by a midportion, said midportion extending from

- said first end between the two members on the left side of said center lines of said members at the top of the members from which point the strip extends downward toward the bottom of the members where the strip crosses the center lines and then extends upwardly exiting from between the two members on the right side of said center lines at the top of the members, said strip of material extending at least part way around at least one of said anchor means and said friction posts; and
- closure means connected in operative relation with said first and second clamp members for selectively urging said members together against said strip of material.
3. The adjustable brake set forth in claim 2 wherein said friction posts are integral with said first member, and each of said posts has a cavity in the center thereof extending at least part way through the post on the axis of the post.
4. The adjustable brake set forth in claim 2 wherein said first mentioned closure means is located substantially at the center of said members; and including secondary closure means operatively connected to said members for selectively applying a force urging said members together, which force is selectively applied at points on the left and right sides of said center lines near the edges of the members.
5. The adjustable brake set forth in claim 2 wherein: said anchor means includes an anchor post integral with said first member and extending through a hole in said second member, said anchor post having an axial hole therethrough adapted to receive therethrough a midportion of an anchor rope fixed to a relatively stationary object, said anchor post extending beyond the second member, whereby a downward pull on the two ends of the anchor rope will not tend to pull the two members together.
6. The adjustable brake set forth in claim 2 including:
 - a first index post on said first member extending through a hole in said second member, said index post being located on said center lines at the top of said members; and
 - a plurality of friction posts on the left side of said center lines and a plurality of friction posts on the right side of said center lines, each of said last mentioned friction posts on the left and right sides of said center lines being integral with said first member and extending through a juxtaposed hole in said second member.
7. The adjustable brake set forth in claim 6 wherein said friction posts on the left side of said center line includes a mid-elevation post, a lower elevation post, and an upper elevation post; and the friction posts on the right side of said center line includes a mid-elevation post, a lower elevation post, and an upper elevation post.
8. The adjustable brake set forth in claim 6 wherein said mid-elevation posts are further away from said center lines than said upper elevation posts.
9. The adjustable brake set forth in claim 6 wherein said mid-elevation posts are further away from said center lines than said lower elevation posts.
10. The adjustable brake set forth in claim 6 wherein said mid-elevation posts are further away from said center lines than said upper and lower elevation posts.