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Ott

[11] 3,752,475
[45] Aug. 14, 1973

[54] AXLE-MOUNTED WHEEL EXERCISING DEVICE WITH SPRING RESISTANCE LOCATED CENTRALLY WITHIN THE WHEEL

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[21] Appl. No.: 155,057

[52] U.S. Cl. ..... 272/83 A, 272/82, 272/83 R
[51] Int. Cl. A63b 21/22
[58] Field of Search ..... 272/57 R, 83 R, 83 A, 272/82, 79 R, 79 A, 79 B, 79 C, 79 D, 67, 68, 1 R, 84, 57 J; 128/25 R, 25 B, 57, 60

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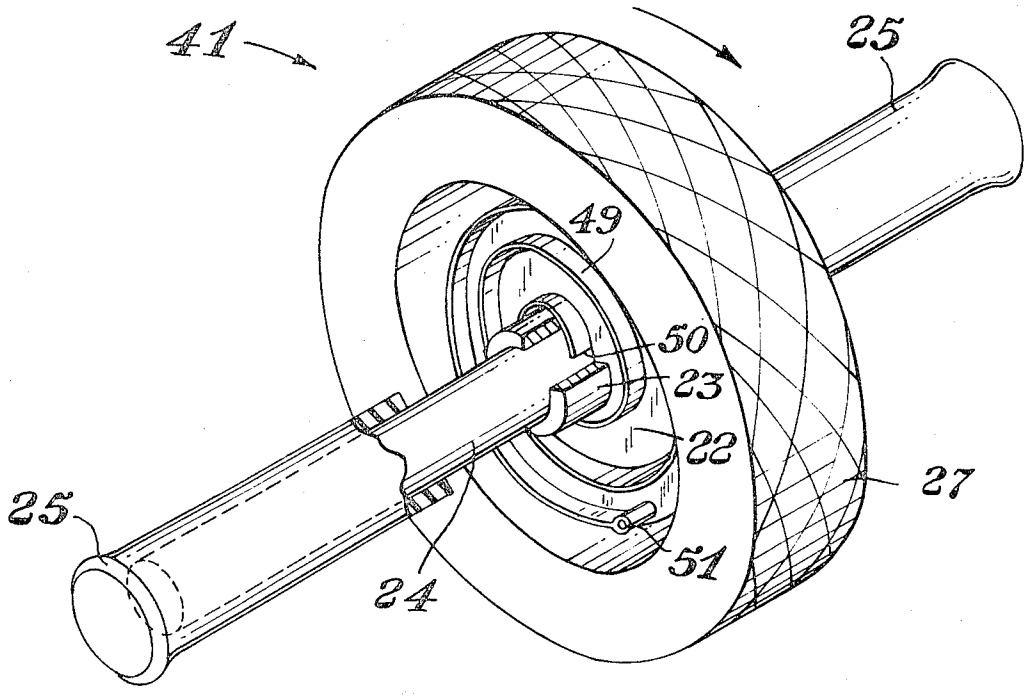
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Primary Examiner—Anton O. Oechsle
Assistant Examiner—Arnold W. Kramer
Attorney—N. Jerome Rudy

[57] ABSTRACT

An exercise wheel or appliance comprises, in combination with a wheel which wheel is rotatable about a generally central axis of generation therefor, spring means in operative association with the wheel and axle for increasingly resisting rotation of the wheel with and upon increasing rotation of the wheel.

7 Claims, 18 Drawing Figures



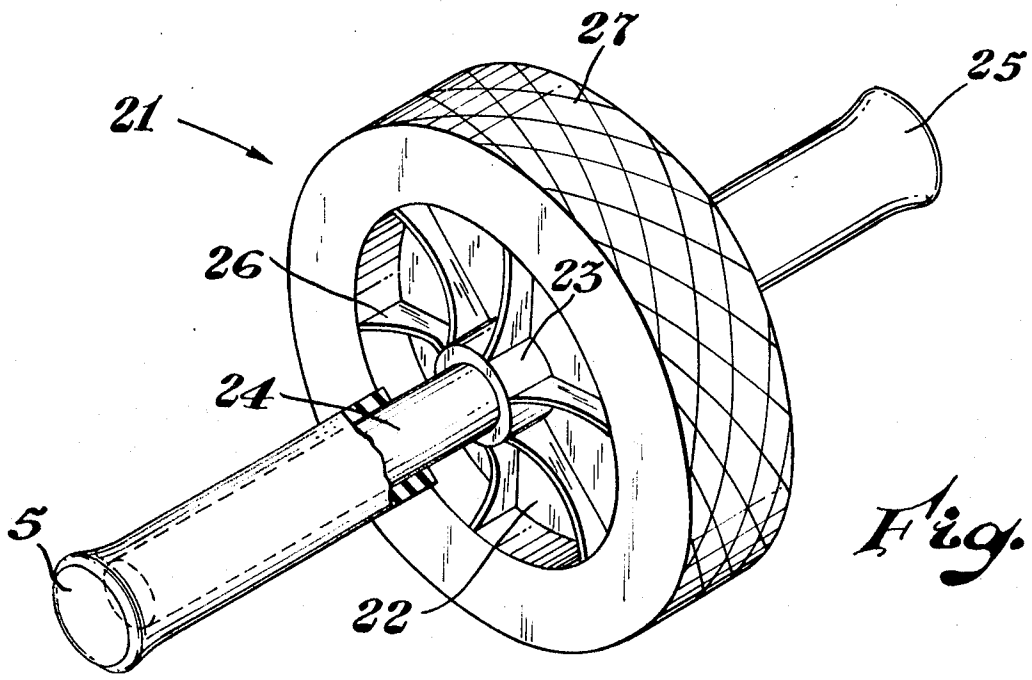


Fig. 1

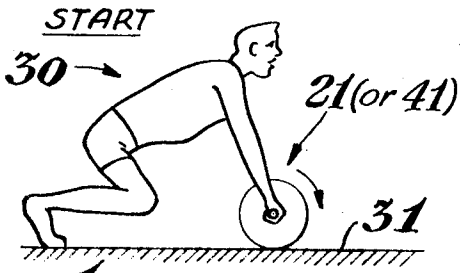


Fig. 2

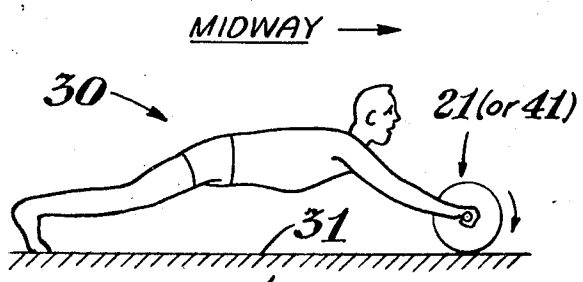


Fig. 3

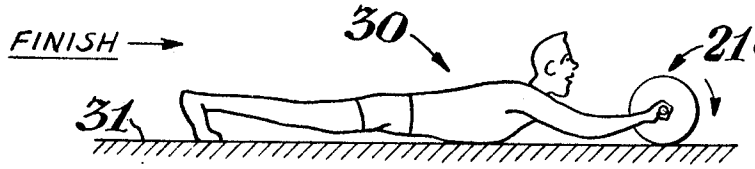


Fig. 4

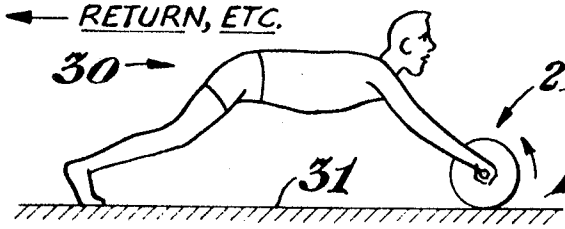


Fig. 5

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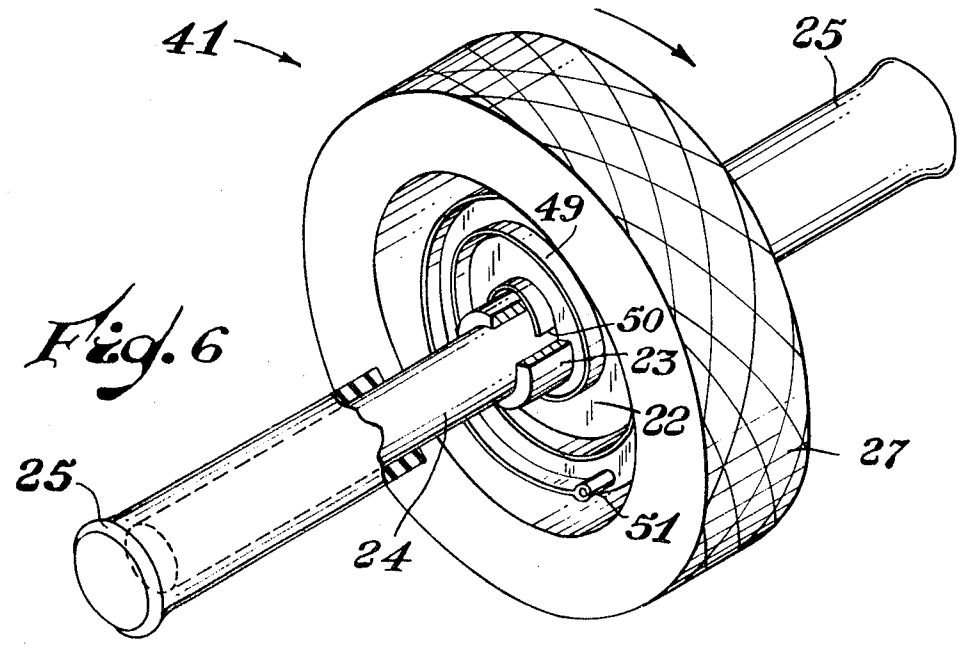


Fig. 6

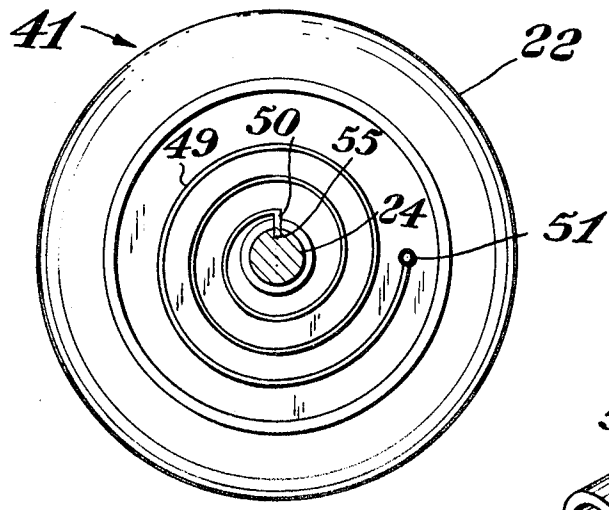


Fig. 7

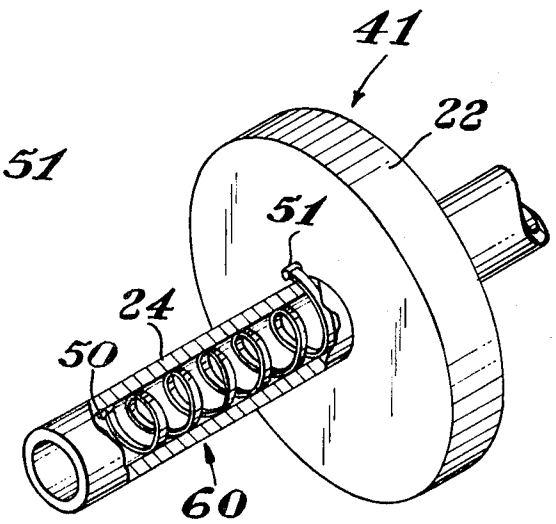


Fig. 8

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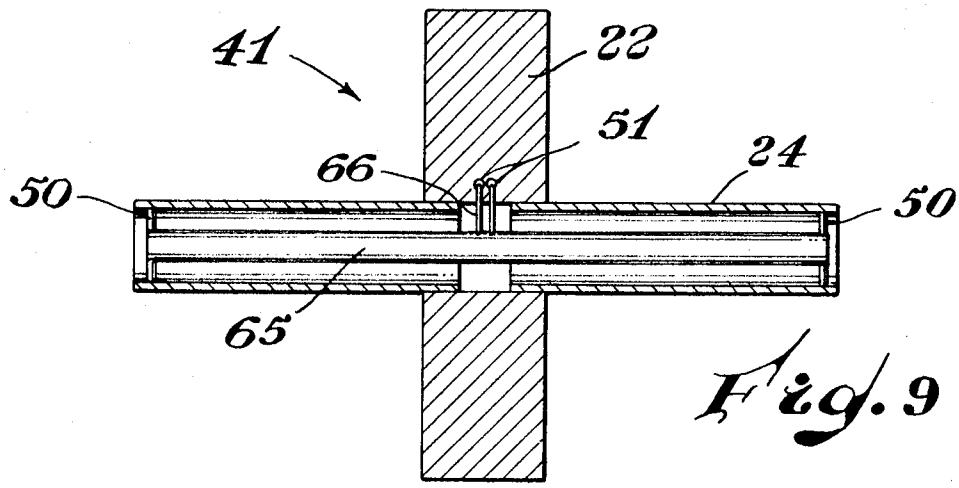


Fig. 9

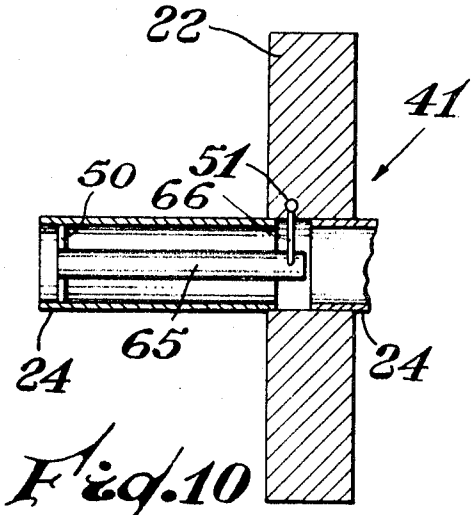


Fig. 10

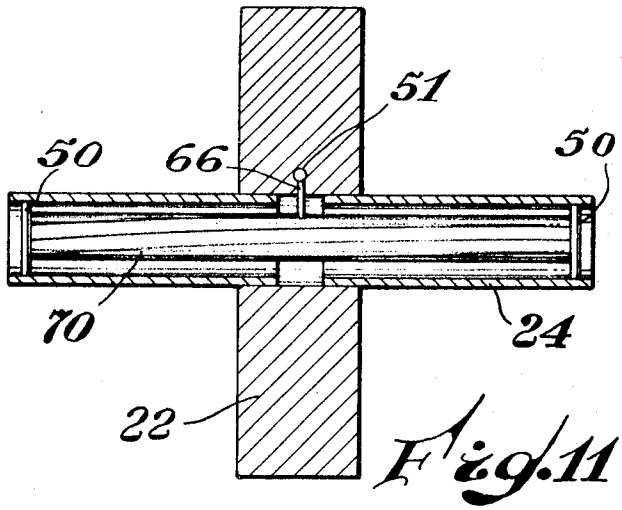


Fig. 11

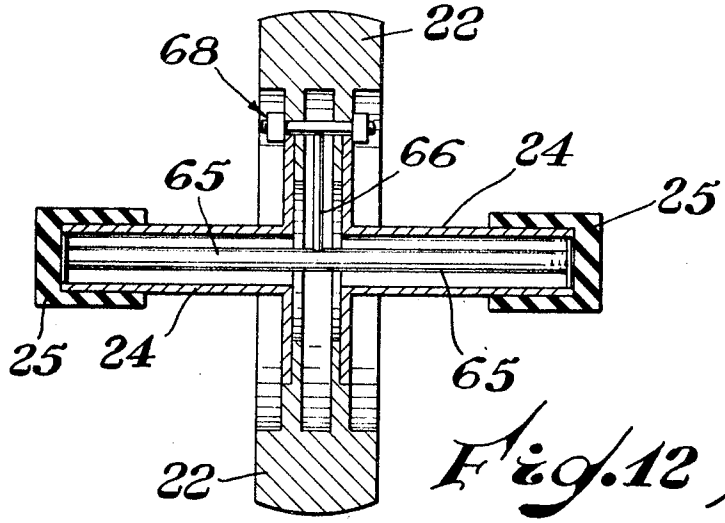


Fig. 12

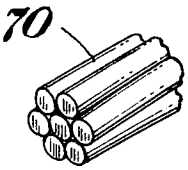


Fig. 13

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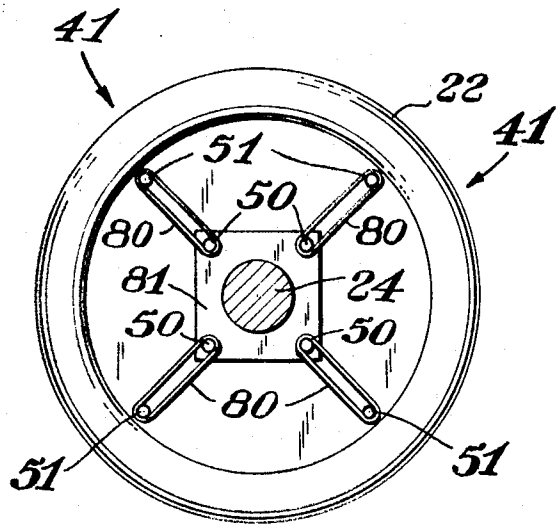


Fig. 14

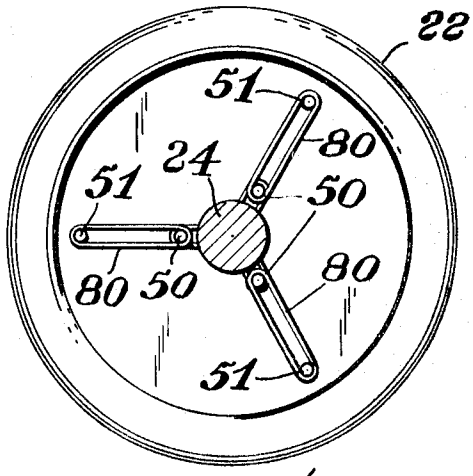


Fig. 15

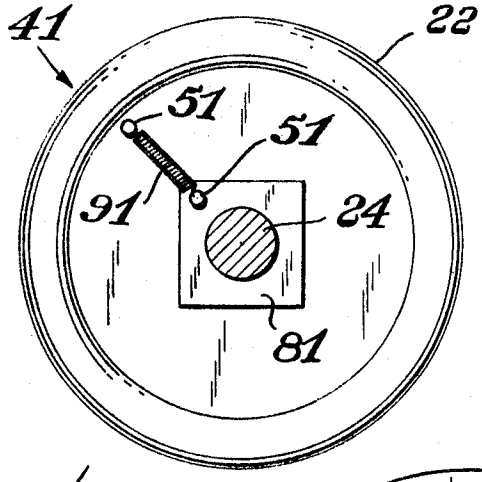


Fig. 16

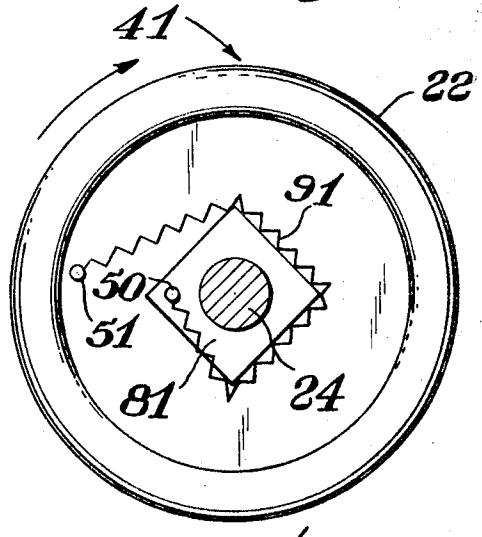


Fig. 17

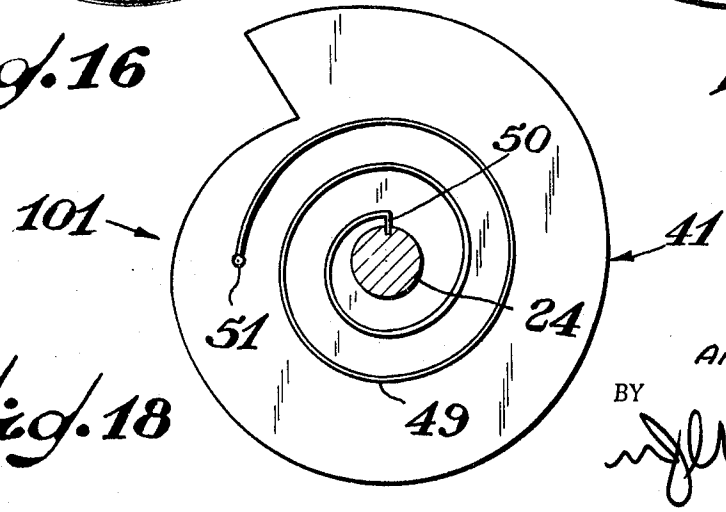


Fig. 18

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AXLE-MOUNTED WHEEL EXERCISING DEVICE WITH SPRING RESISTANCE LOCATED CENTRALLY WITHIN THE WHEEL

DESCRIPTION AND CHARACTERIZATION OF INVENTION

This invention concerns and pertains to a new and improved device or appliance for use as an aid to or in conjunction with exercise and physical conditioning.

In the art and practice of calesthenic physical conditioning, there are many exercise patterns and practices that are followed. Popular amongst these are so-called "push-ups," in which the person doing the exercise lies supine, stomach-down on a floor or deck with hands in direct correlation (at least approximately) under shoulders and then, with body as rigid as possible (with, preferably, stomach and knees never actually touching the floor), pushes himself up from the floor to the highest possible elevation with the arms (using the body in such position); then returns himself as close as figuratively possible to the floor or deck only to resume the exercise as many times as capability may permit or as may be desired for the involved individual.

Some improvements have been made on the "push-up" exercise. For example, The Royal Canadian Air Force has in its well-known and recommended procedures for exercise prescribed a manner in which the person starts in a position in which he is kneeling on knees and arms, i.e., "on all fours," then pushes the body forward sliding out along the hands (with arms rigid as possible) until the entire body, stomach-down, is extended and contiguous with the deck with arms extended out beyond the head and shoulders parallel to the deck in assumption of the first extended position. The next part of this prescribed exercise is then to return, with power primarily through the arms and hands and by reverse sliding action, to the original kneeling on knees and arms position with the body being kept as rigid as possible during the maneuver. This, of course and as is known by anyone having done it, is a very difficult and severe exercise.

As an implementation upon and for and improvement with the above-mentioned and described Royal Canadian Air Force exercise technique (hereinafter more fully illustrated and described), there has come into vogue and utilization certain simple devices to assist in the performance and execution of the indicated style of exercise in and for physical conditioning. One popular form of this comprises, in essence, a simple wheel and axle with which the person making the exercise grasps the axle and rolls out with and returns upon the wheel rather than sliding back and forth upon the hands.

The fundamental idea of the Royal Canadian Air Force procedure, per se, and practice of the improved technique with the wheel and axle accessory device are approximately the same. And, likewise, the problem and difficulty for many people doing this exercise is also literally identical — and of considerable consequence and frequent disadvantage. Practically all of this is directly related to the imperfect or not-as-good-as-desirable condition of the bodies of many people who do the indicated exercise combined with and complicated by the mechanical and physical limitations of the human body.

In other words, as it obviously is, when the arms starting from an outstretched, extended position perpendicular to the chest and torso are increasingly moved to a position upright along the head and then parallel to the body, the leverage and capability for lifting or lowering the body which is therein involved decreases greatly. Thus, a person who can push the body in a supine position directly up from the deck with the arms disposed perpendicular to the body may not, due to loss of leverage, be able to do so from the same relative starting point when the arms are extended over the head and parallel to the body. This, as indicated, is because of insufficient strength in the last-mentioned disposition of the body for most people due to the mechanical and physical rules of leverage which apply to all people and which, in the cases of many people, may make the indicated exercise(s) extremely difficult, if not impossible.

For the apparent reasons indicated, the exercise form mentioned which is advocated by the Royal Canadian Air Force is oftentimes actually injurious or even disastrous to many people; being often even more so the case when the wheel-and-axle device for use in conjunction with the explained variation thereof is employed. Because of increasing lack of arm leverage as the arms become more extended towards, over and alongside of the head and also due to lack of strength in many people to control this, the body during the indicated type of exercise often fails and collapses more or less abruptly. This, besides being frustrating or painful, or both, can sometimes because of the shock and physical distortions involved result in serious damage to the body in various places, but especially to the head, neck, elbows, chest and back.

The objective of this invention is to provide an improved and more practical and beneficial exercise device or appliance for use in and with the above-described manner of physical manipulation; which device, amongst the objective(s) of this invention, tends to eliminate the drawbacks, impracticalities and inherently possible dangers of doing the indicated style of exercise as heretofore known.

These benefits are achieved by utilization of a device in accordance with the present invention which device comprises in combination with a wheel and central axle, means in operative association with said wheel and axle for increasingly resisting rotation of the wheel with and upon increasing rotation of the wheel.

All of this, and many other features and advantages of this invention will become and is more fully apparent in the following description, taken in association with the accompanying drawing, wherein:

FIG. 1, in a broken away and partly in section perspective, shows one form already known of the basic wheel and axle device for execution of the indicated form of exercise which is for the improvement upon and better performance of the described Royal Canadian Air Force manner of exercise;

FIGS. 2 through 5, inclusive, illustrate in a figurative and fanciful manner performance by any person of the herein-contemplated type of exercise using either the simple, previously-known wheel and axle device above-explained and shown in FIG. 1 or with and pursuant to use of the improved device of the present invention;

FIG. 6, in broken out perspective, shows a preferred form of embodiment of the improved form of exercise device pursuant to the present invention;

FIG. 7 shows the embodiment of FIG. 6 in a side view with an advantageous feature therefor included; and

FIGS. 8 through 18, inclusive, with some partly in section and others merely schematic and illustrative, indicate and more fully explain other desirable and advantageous embodiments of the present invention.

There is shown in FIG. 1 a simple wheel and axle assembly, generally identified by the numeral 21, for assistance in and for performance of the known manner, as has been indicated, of exercise which is, for practical purposes, a variation upon and from the described style of physical manipulation prescribed by the Royal Canadian Air Force. In the assembly 21, there is a wheel 22 through which in a central hub 23 provided therein there is placed and disposed an axle 24 about which the wheel 22 is rotatable. Of course, embodiments in which (as in the old-fashioned rolling pin) the axle is rigidly fixed to the wheel may also, but with less convenience and greater difficulty to the hands of the user, be employed. In other words and as appears, the wheel 22 shown in FIG. 1 is rotatable about and around its own axis 24 of generation. Advantageously and if desired for the comfort of the user, handle-bar grips 25 of any desired composition may be provided at and/or inwardly from each end of the axle. For example, the handle-bar grips that are utilized may be of the type shown and described in U.S. Pat. No. 2,618,986. The wheel 22 may be of any desired material sufficient in strength to support at least the full weight of a human body. As an illustration, metal (such as steel, etc., or aluminum), plastic (such as polyethylene, polypropylene, polystyrene, ABS , etc.) or the like or equivalent may be utilized. If desired and for reinforcement purposes, the wheel 22 may be provided with spokes, splines or the like 26. Advantageously, the wheel 22 is equipped with a solid or hollow — or even pneumatic — rubber or the like tire 27 for comfort, convenience and silence during operation of the device.

It is quite desirable and convenient, particularly for purposes of storage and/or transportation, if the axle 24 is readily removable from (and re-insertable into) the wheel 22. For example, in the simple device illustrated, the axle 24 upon removal of either or both handle grips 25 can be readily inserted into and taken out through the hub 23 of the wheel 22.

Although it can be of any desired size, the diameter of the wheel assembly 21 shown in FIG. 1 (including any tire accessory, if any, mounted thereon) is between about 5 and 10 inches or so, advantageously between about 7 and 8 inches. While not critical and according to the inclination and desire of the user (or manufacturer) of the wheel, the width is usually on the order of, say, ½ to 2 inches. And even though not shown or illustrated, it is apparent that more than a single wheel, if desired, can be provided in pairs or more on and about the same axle.

FIGS. 2 through 5, inclusive, and obviously upon study illustrate the use of the known wheel assembly 21 (as well as that numbered generally 41 in FIG. 6 and other equivalents thereof as are hereinafter more fully described and all pursuant to the present invention) in exercise and physical conditioning by any person whose body, for illustrative purposes and shown only figuratively in FIGS. 2 through 5 is identified generally by reference numeral 30 working upon and over a floor or deck generally indicated by numeral 31.

FIG. 2 illustrates the start of the exercise, i.e., with the body 30 over and contacting the floor 31 on knees and arms with the wheel exercise assisting device 21 (or 41, with reference as to assembly 41 below to FIG. 6 and the following FIGS. through FIG. 18) grasped in hand. The body 30, to commence, is upright on hands and knees at the start. Then the arms push the wheel assembly 21 (or 41) out away from the body with arms and midsection of the body being maintained as rigid as possible, knees remaining in position on the floor 31, while the arms going out commence to assume a position which finally is such that the arms are over the head and parallel with the body 10 which is then prone, or near to prone, with the stomach of the body 30 then parallel with and flat upon or near to the floor 31.

FIG. 3 illustrates the midway point in this exercise and FIG. 4 the finish.

FIG. 5 demonstrates the return movement wherein the person with muscles of the arms and shoulders and other muscles of the body 30 pulls back in the reverse direction on or partially supported by and with the exercise wheel assembly 21 (or 41) to reassume and recommence the start position (as shown in FIG. 2) of the physical manipulation.

Ordinarily, throughout the entire exercise as explained, the wheel exercise device — depending upon the length (or height) of the body of the person employing it including arm reach — will make perhaps, as more or less extremes, between 1 and 3 revolutions — depending, as is apparent, on the precise diameter of the wheel being utilized and the proportions, as indicated, of the person using it. In the more usual case, a normally-sized and -utilized wheel will go between 1½ to 2½ (generally about 2) revolutions each in both the forward and backward directions throughout the entire exercise cycle.

The described exercise is believed by many to be very good and beneficial. However, as indicated, it unfortunately involves and interjects many problems for many users due, as indicated, to the imperfections and lack of adequate physical strength and stamina to practitioners of the indicated technique. Primarily and for the reasons above mentioned, this is due to increasing lack of leverage for uplifting of the body away from the horizontal as a person's arms become increasingly extended from a position perpendicularly away from the chest to one wherein they are extended over the head and parallel with the torso. This increasing lack of support for the body as overhead (or towards overhead) extension of the arms is made is such that in performance of the presently described exercise, many people upon assumption of the midway or half-way position illustrated in FIG. 3 lose all control and go abruptly all the way out to the finish position depicted in FIG. 4; landing flatly (and painfully — with sometimes uncomfortable and injurious physical consequences to many parts of the body) on their face, as it were. Little imagination is required to comprehend the possible implications and/or disastrous results of what is here set forth and described.

Use and application of a wheel exercise device or appliance pursuant to the present invention significantly reduces and to a very large measure avoids the problems associated with presently-known exercise wheels for physical culture and exercise manipulation of the type described. It makes the indicated type of exercise using an exercise wheel in concert therewith much more practical, attractive and relatively safe and devoid of the above-described problems inherent for many people using, in the described physical manipula-

tion, an unrestrained exercise wheel of the heretofore-known type and style.

In essence and as indicated, and in achievement and realization of the objectives of the present invention and for fulfilment of the purposes explained, an exercise wheel or appliance or device in accordance with the present invention comprises and, simply enough, is an assembly that is: in combination with a wheel and a generally central axis with said wheel being rotatable about its axis of generation, means in operative association with said wheel and axle for increasingly resisting rotation of the wheel with and upon increasing rotation of the wheel — all as still further hereinafter more fully explained.

The achievement of this, all according to and illustrating preferred embodiments of the invention, are initially shown in FIGS. 6 and 7.

FIG. 6 illustrates the preferred sort of the exercise wheel device according to the present invention and designated generally by the reference numeral 41. In this device, insofar as concerns analogy to the known embodiment illustrated in FIG. 1, there are: the wheel 22 which (optionally, advantageously but not necessarily) may have thereon mounted a tire or the like 27 through the central part of which an axle 24 extends. Also in a way analagous to the known exercise wheel, handle-bar grips 25 may be employed about the axle. As mentioned, other dimensions and fundamental features of a wheel device according to this invention are quite often analogous to those described for the heretofore-known wheel device(s) for exercise.

However, pursuant to the present invention, the exercise wheel device of FIG. 6 has, as illustrated, means in operative association with the wheel 22 and axle 24 for increasingly resisting rotation of the wheel with and upon increasing rotation going on of the wheel relative to the axle. In the embodiment illustrated in FIG. 6, this means is a spiral spring 49 fastened (or connecting or engaging) at its inner end in any suitable way through the hub 23 (if one is utilized) at one connection point 50 to the axle 24 and proceeding convolutely about the axle 24 at the other or outer end of the spring 49 to another connecting point 51 which affixes the outer end of the spring to the wheel, all as is shown in FIG. 6.

The spiral spring may have and be comprised of as many revolutions as desired for the purpose. Those skilled in the art will readily understand this, taking into account that according to generally applicable principles and knowledge the more turns that are embodied in a spiral spring the closer it will approach possibility of a constant torque action. The spiral spring 49 should be made of any suitable material, such as steel or other metal or equivalent substance to give the required resistance to turning of the wheel in a forward direction and the required urging of the wheel backwards to its original position. Usually, 2 to 5 and preferably 3 to 4 or so spiral turns in the spring are desirable, although, of course, more or less can be employed. In this connection, it is ordinarily desirable for the spiral spring 49 to be so disposed and oriented relative to the forward movement of the wheel 22 about the axle 24 that the spring unwinds or opens upon such movement and, in urging towards backward movement of the wheel, that the spring closes and assumes its original disposition. Nonetheless, the opposite can be equally utilized; i.e., to have the spring compress with forward movement of the wheel and in its reverse urging of the wheel in the backward direction, as it were, to open until return to the original disposition.

It can be seen that the contemplation involved in and for accomplishment of the present invention is very easy to comprehend and achieve when the instant improved wheel exercise device is employed. Following the illustrations of FIGS. 2 through 5, the resistance of the spring (or other means) between wheel and axle minimizes the problem of decreasing lack of arm leverage as the arms are extended so as to avoid or tend to avoid the difficulty as above-described of the person losing control abruptly as the arms become extended more and more over the head and parallel with the torso. In addition, the return urging of the wheel assembly 41 commencing with the "finish" or essentially full-out position of the body shown in FIG. 4 and going through the return position illustrated in FIG. 5 is very much facilitated by the action of the spring or other means in the wheel exercise assembly 41 to return the wheel 22 to its original position with the spring or other means 49 unextended. All of this is done without any material loss in effect of or detriment to the advantages and desirable benefits of the presently-contemplated exercise performance.

The optimum strength of the spring or other means utilized in the exercise wheel assembly device 41 of the present invention depends, of course, to some measure on the weight of the body of the person employing the device. While generally for beneficial effect the strength of the spring should have a resistance to rolling motion in travel of the wheel along a supporting surface of at least 5 pounds in its unwinding and may have as much as up to 100 or more pounds, it is advantageous for the resistance of the spring or other means urging against rotation of the wheel to be between about 15 or so and 50 – 60or so pounds. Considered in another way, the strength of the spring or other means resisting unwinding efforts against rotation of the wheel is desirably between about 10 percent and 90 percent of the weight of the body of the user of the wheel exercise device 41; preferably between about 20 percent and 50 percent or so. As can be perceived, anyone with some modicum of ordinary skill can, given the desired strength and characteristics of the spring or other wheel-revolution-resisting means employed, readily calculate and provide a suitable strength mechanism for the purpose.

As mentioned in the foregoing, it is advantageous for the presently comtemplated types of wheel exercise devices to be dismountable so that the wheel can be removed from the axle for transportation and storage. FIG. 7 shows one simple way of doing this using the type of assembly 41 described in detail in connection with FIG. 6. Thus, the unfastening point 50 of the spiral spring 49 to the axle 24 can be accomplished simply enough with a turn-in or projection from the inner end of the spring 49 so as to fit in and be restrained in a slot 55 provided in the axle 24. In other words, this may be what can be described as a "dog-catch" engagement means, i.e., with the inner end of the spring abruptly deformed and departing from strict spiral shape into a "hook" portion bent so as to generally provide a radially inward projecting section at the inner end of the spring. In this way, the axle can be readily removed from the wheel and reinserted therein without affecting or disruption of the spring 49.

With the type of spiral spring assembly described in connection with FIGS. 6 and 7, the spring 49 can be covered with and by a flange (not shown) or other protective insert thereover in its disposition within the wheel 22. In this connection, it is obvious that more than a single spring can be employed if so desired with any given wheel (including plural spring installations so arranged as to have sequential engagement action) and that, as is above-mentioned and if desired, more than one wheel can be utilized on and with any given axle in and with any of the exercise wheel assemblies of the present invention. Along this line, the spring installation utilized can have any desired resistance profile to unwinding or compression in case it may be wanted to have in the progress of movement of the wheel a varying resistance at any point or points or segment or segments of the wheel rotation in its travel from the "start" to "finish" positions and, conversely, in return. Thus, the torque resistance against wheel movement caused by the spring means need not be constant throughout travel of the wheel but may, for example, be greater towards the "finish position" than at the start or may increase or maximize at one or more segments of wheel travel between the "start" and "finish" positions. Any and all such variations may follow personal preferences, if any, therefor and suitable spring construction and constitution to facilitate same is a relatively straightforward accomplishment to anyone skilled in the art.

Accordingly and in still further amplification of the thought expressed immediately-above in the foregoing, one can engineer the spring installation to provide any desired wheel-movement- resistance pattern in and for the exercise device assembly 41 of the present invention. The resistance caused by the spring or springs (or equivalent means) utilized can be devised to build up quickly and flatten off, if so desired, or and alternatively (adding to the above characterizations) to commence slowly and build up resistance as wheel movement progresses. For the simplest sort of increasing or decreasing spring torque to resist wheel movement, tapered spiral springs and the like can advantageously be utilized.

With further reference to the most desirable strength of the spring or other wheel-revolution-resisting means to be employed, it is also apparent that the same for any given person utilizing a device of the contemplated type is readily measurable and determinable. Thus, the most beneficial torque on the wheel to secure optimum results in the exercise for any given person can be readily estimated or fixed in any of many different ways. For example, a spring scale can be used in conjunction with a tape around the diameter of the wheel to determine the desired resistance for the spring or the like. Such investigation and finding can obviously be easily made by anybody with an ordinary mechanical inclination to and for the purpose. Along this line, it can additionally be readily seen that different strength springs can be readily made available for the same wheel and axle assembly so as to be capable of being put in on request to suit the person utilizing the device after determination of the best spring-resistance or torque on the wheel assembly desired to have a most advantageous effect with and for a given person who intends to do the exercise therewith.

In FIG. 8 there is schematically illustrated another embodiment of the invention showing, as the wheel-revolution-resisting means a helical torsion spring 60 fixed at one end at the connecting point 50 to and within the axle 24 and at the other end at the connecting point 51 to the wheel 22. Although not particularized in FIG. 8 for reasons of maximum simplicity in presentation, it can be appreciated that in such an assembly there should be a slot or the like receptacle to accomodate the end of the spring to the wheel and that the tube comprising the axle should be sufficiently open at its central, wheel-support portion to permit an arm or other member to make the connection from the spring end to the wheel. Such a helical torsion spring 60 as is illustrated in FIG. 8 may be disposed within only one side of the axle or, alternatively — even though not so shown — within the full length of the axle with suitable connections being made between spring and wheel.

Another advantageous manner for providing the wheel-revolution-resisting means in the exercise device assembly 41 of the present invention is illustrated, again schematically, in FIG. 9 which shows the assembly in cross-section. For and in such embodiment, a torsion bar 65 is disposed throughout the internal length of the axle and fixed at its ends to the axle by connecting means 50 and centrally through a suitable fastener 66 to the wheel at connecting point 51. As is apparent, rotation of the wheel causes turning of the torsion bar which resists the rotation and urges return of the wheel to its original position.

Alternatively, as is illustrated in FIG. 10, a torsion bar 65 can be utilized through only half or less of one side of the axle through connecting points 50 and 51 to provide a similar means and result.

FIG. 11 shows another advantageous variation of the torsion bar effect. In this case, as is again schematically depicted in FIG. 11, the wheel-revolution-resisting means is comprised of a stranded cable 70 affixed to and at its ends within the axle 24 at connecting points 50 and through a suitable fastening means 66 to connecting point 51 in the wheel 22. Advantageously, as is illustrated in FIG. 13, the stranded cable 70 employed is a seven-strand cable, although a cable having any desired number of strands may be utilized. When a stranded cable 70 is utilized, it is desirable for it to be end-loaded in tension within the axle 24, since restrainment at its ends for and from the fixed distance of the cable eliminates tendency of a cable wheel-revolution-resisting means to kink. Although, somewhat analogous to the situation involved when a torsion bar wheel-revolution-resisting means is used, it is generally better when employing a cable to have it extend the full (or nearly approaching full) length of the axle; a cable extending from one end or equidistant from one end of the center of the axle to the approximate axle center within the wheel may also be used. Actually, it is possible in some cases to use to advantage an off center cable since, as the rotation of the wheel proceeds the moment exerted on the cable — or the leverage thereon — would tend with the rotation to change from maximum to minimum to maximum durated in any given 360° revolution pattern.

Actually, in embodiments of the sort schematically and most simply illustrated in FIGS. 8, 9 10 and 11 it is literally for all practical purposes necessary to employ a two-part axle element to allow for connection between the resilient element (such as torsion bar, spring or cable) disposed longitudinally within the axle

and the wheel itself by means of some suitable linkage piece. This, as will appear, can be provided by means of a pivot with bearings in the wheel or by means in combination with such an arrangement of independently fixed handles. The cross-sectional illustration of FIG. 12 depicts one figuratively-shown way of achieving this. In FIG. 12, the wheel 22 is mounted and supported on a two-part axle 24 (having handle-bar grips 25 at each end) which is centrally flanged at the interior end of each part or piece of the axle to permit attachment anf fixing of the wheel to the axle (in, for example, the simple manner of engagement illustrated). The resilient torsion bar, spring, cable or like element 65 is connected and secured from its central portion through a bar, rod or other equivalent connector 66 to and through fastening means 68 (of any desired and practical sort) to the interior of the wheel 22.

FIG. 14 illustrates yet another variation of embodiment for means to resist the rotation of the wheel 22 in the exercise assembly 41 according to the present invention. In such embodiment, the wheel-revolution-resisting means is comprised of generally radially extending flexible resilient elements 80, provided in numbers from 1 to "X" as may be desired, connected at point 51 to the wheel through points 50 directly to the axle 24 or, if desired and as is shown in FIG. 14, to a piece or fixture 81 about and either permanently or removably affixed to the axle. The manner of connecting the resilient elements 80 directly between the axle 24 or a transmission piece 81 and the wheel 22 may be in any of many ways, as desired and appropriately suitable for the purpose. In addition, as is also the case with all the other embodiments of the present invention, it is within ordinary skill to have the axle in such a particular variety of assembly 41 removably inserted within the wheel.

The resilient elements 80 may be suitably-strengthened rubber bands or the like disposed between the connecting points 50 and 51 in the manner suggested by the illustrations of FIGS. 14 and 15 or, if preferred, may be single, suitably-affixed extensible and resilient members in the form of rods, straps, bars or the like. They may, as desired and for utilization pursuant to the depictations of FIGS. 14 and 15, be made of natural or synthetic rubber or other equivalent and satisfactory elastomeric and resilient plastic or synthetic materials or they may be in the form of spiral metal springs or the like (as is particularly illustrated by the coil spring resilient element 91 in FIG. 16).

The above-mentioned FIG. 15 shows a variation from the embodiment depicted in FIG. 14 in the number and type of flexible resilient elements 80 utilized in an embodiment according to the invention. In FIG. 15, three elements 80 using appropriate fastening means of any desired sort affixed directly to the axle are illustrated. As mentioned, any desired number of such flexible resilient elements beginning with one may be utilized and the strength of each such element proportioned according to number and to the desired wheel-revolution-resistance called for.

FIG. 17 illustrates a wheel exercise assembly 41 according to the present invention in a rotated position showing the flexible, resilient element 91 (of the type described in connection with FIG. 16) in an extended and withdrawn position. In such position, as appears, the element 91 (or its equivalent) tends to urge with appropriate torque return action the counter-revolving and replacement of the wheel to its original position.

Other embodiments of the wheel exercise device of the present invention can also be fabricated and utilized, particularly those wherein in certain frequent cases, although not necessarily so, a generally larger wheel is employed having a more or less eccentrically located axle so as to give the added advantage with the wheel-revolution-resisting means the benefit of a cam effect. As a variation in such a case and as is shown in FIG. 18, the wheel itself can actually (and especially when a larger wheel diameter variation is used) be shaped in the form of a cam — designated by the reference numeral 101 in FIG. 18 — or it may merely be a complete wheel with the eccentrically positioned or effected axle (the last-mentioned possibility being not shown or illustrated in the Drawing since it construction and arrangement is easily perceivable). In any case, the added cam effect of such an embodiment tends to restrict rotation of the wheel as the person pushes out during the above-described exercise (even though the body position may assume a slight angle from the horizontal) and a desired tendency to roll back and restrict the outward thrust of the exercising body is experienced.

As will appear to those skilled in the art, other embodiments of the wheel exercise assembly of the present invention can be devised whereby, for example, the wheel-revolution-resisting means is comprised of pneumatic or hydraulic mechanisms operating between the axle and, by way of illustration, an inflatable tire on the wheel to restrict revolution and urge the wheel back to an original position.

Many obvious changes of and modifications in the various features and elements involved in and for practice of the present invention can be readily entered into and realized. Therefore, it is to be fully understood that the invention is not to be limited to or restricted by the several illustrative embodiments and particulars that constitute part of the foregoing description and specification. Rather, knowing the stated intention hereof, the invention is to be interpreted and liberally construed in the light of what is recited and set forth according to the definition and meaning of the hereto appended claims.

What is claimed is:

1. An exercise device of the type described, said device adapted to support the weight of the body of a user thereof, comprising:

i. a wheel;

ii. an axle mounted centrally for and through said wheel about which said wheel rotates;

iii. said axle passing laterally through said wheel and extending from each side of said wheel for a distance sufficient for each laterally extending portion of said axle to be respectively grasped and held in the hands of a user of the device so that said wheel when said device is so grasped is between the hands of the user and, when so held and employed for body support, said device is adapted to be moved and rolled back and forth on and over a supporting surface in a direction substantially parallel with the torso of the user of the device;

iv. at least a single spring means central within the circumference of the wheel in operative association with said wheel and axle for increasingly resisting rotation of the wheel with and upon increasing

rotation of the wheel while said central axle is held and grasped by the user so as to avoid rotation of said axle during rotation of the wheel therearound;

v. mounting and affixing means on said wheel and on said axle for connecting the outer and inner ends of said spring means respectively to said wheel and said axle; with

vi. one and the inner end of each of said spring means secured to and by the mounting and affixing means therefor on said axle;

vii. the other and the outer end of each of said spring means secured to and by the mounting and affixing means therefor on said wheel; and

viii. both said spring means and said axle and wheel mounting and affixing means therefor disposed and positioned within the circumference of the wheel and also within the side limits of the central radial planar configuration of the wheel.

2. A device according to claim **1**, wherein

said means for increasingly resisting rotation of the wheel is a spiral spring convolutely disposed about said axle and connected at its ends to said wheel and axle.

3. The device of claim **2**, wherein

said spiral spring has between about 3 and about 4 convolutions in itself about and around said axle.

4. The device of claim **2**, wherein

said spiral spring is affixed at its inner end disconnectably to said axle and

said axle is removable from engagement with said spring and said wheel.

5. A device according to claim **1**, wherein

said axle is removable from said wheel.

6. A device according to claim **1**, wherein

said wheel has a diameter of between about 5 and about 10 inches.

7. A device according to claim **1**, wherein

said axle is disposed eccentrically in said wheel.

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