CHAIR WITH EXERCISE APPARATUS

Publication Classification

ABSTRACT

An ergonomic chair that serves the conventional chair functions such as an office, desk or side chair and that functions as a motion or exercise chair as well. The exercise components include armrests and a headrest that convert to apparatus for exercising muscles in the shoulders, chest, arms, back and lateral thoracic area of a person seated in the chair. Additional apparatus is provided for exercising the legs of the person seated in the chair.
CHAIR WITH EXERCISE APPARATUS

BACKGROUND OF INVENTION

[0001] 1. Field of Invention

[0002] This invention relates to chairs that have exercise apparatus incorporated into them, and that may be used by a person while seated in the chair. More particularly, the chair is suitable for use as a desk chair and enables the chair occupant to perform one or more exercises even while doing desk work in the chair.

[0003] 2. Discussion of Related Art

[0004] It is well recognized that regular exercise is very beneficial and that providing a convenient means for exercising for those who spend long hours at a desk is very desirable. A number of patents and published applications are directed to chairs that provide means for exercising while seated in them including the following: U.S. Pat. Nos. 3,738,649; 4,913,423; 4,921,247; 5,044,633; 5,599,260; 5,690,594; 5,755,650; 6,099,445 and Publication No. US2002/0142898.

[0005] The present invention enables the occupant of the chair to exercise muscles located in the shoulders, chest, arms, back legs and lateral thoracic area. In particular, a person seated in the chair can perform one or more of the following: shoulder press, pull-down, seated row, chest press, forearm exercise and leg press.

[0006] The invention is embodied in an ergonomic chair which addresses everyday long term seating issues. In one form, the chair ideally functions as an office chair, but it may take other forms. The chair also functions as a motion or exercise chair. The exercise components are an integral part of the chair, particularly those components that exercise the shoulder, chest, back and lateral thoracic area. In particular, the chair addresses the health concerns of sedentary people in an office environment. This is accomplished by incorporating into the armrests and headrest of the chair, components that enable those parts of the chair to perform their ordinary functions for one seated in the chair but further convert to apparatus enabling the person seated in the chair to exercise muscles in the shoulders, chest, arms, back and lateral thoracic area. In one embodiment, additional apparatus is incorporated into a legrest as well. The various exercise facilities may each be used independently of the others.

BRIEF DESCRIPTION OF DRAWINGS

[0007] The accompanying drawings, are not intended to be drawn to scale. In the drawings, each identical or nearly identical component that is illustrated in various figures is represented by a like numeral. For purposes of clarity, not every component may be labeled in every drawing. In the drawings:

[0008] FIG. 1 is a front perspective view of a chair in accordance with one embodiment of the present invention;

[0009] FIG. 2 is a side perspective view of the chair shown in FIG. 1;

[0010] FIG. 3 is a fragmentary perspective view of the armrest assembly;

[0011] FIG. 4 is a perspective view of one armrest sub-assembly illustrating the action of the armrest;

[0012] FIG. 4A is a diagrammatic view of one of the cylinder/piston assemblies;

[0013] FIG. 5 is a fragmentary rear perspective view of the backrest and headrest of the chair;

[0014] FIGS. 6 & 7 are fragmentary perspective views of the headrest support of FIG. 5, showing it in different positions;

[0015] FIG. 8 is a fragmentary perspective view of an embodiment of this invention including a footrest/leg exerciser; and

[0016] FIGS. 9 and 10 are fragmentary views of the pedestal and footrest of the chair shown in FIG. 9 and showing how the footrest may be detached from the chair.

DETAILED DESCRIPTION

[0017] This invention is not limited in its application to the details of construction and the arrangement of components set forth in the following description or illustrated in the drawings. The invention is capable of other embodiments and of being practiced or of being carried out in various ways. Also, the phraseology and terminology used herein is for the purpose of description and should not be regarded as limiting. The use of “including,” “comprising,” or “having,” “containing,” “involving,” and variations thereof herein, is meant to encompass the items listed thereafter and equivalents thereof as well as additional items.

[0018] One embodiment of the chair of this invention shown in FIGS. 1 and 2 in its general organization includes a pedestal/swivel base 20, seat 22, backrest 24, armrest assemblies 26 and headrest assembly 28. An optional legrest/exerciser 30 is shown in FIGS. 8-10. The armrest and headrest assemblies incorporate mechanisms that enable each to be used independently of the other as exercise facilities by the chair occupant. In the embodiment of FIGS. 1 and 2, the arm assemblies enable the chair occupant to perform seated row and chest press exercises and forearm exercises, and the headrest assembly enables the chair occupant to perform shoulder press and pull down exercises. The legrest 30 enables the chair occupant to do leg press exercises. In addition, handles 128 are provided in the backrest and/or seat enabling a chair occupant to do stretching exercises. All of these various components of the chair and the various exercises that may be performed with them are described below.

[0019] The base 20 of the chair in the embodiment shown has radial legs 40 with casters 41 that extend outwardly from a hub 42, which in turn supports an upwardly extending seat post 44. The seat post 44 preferably includes a mechanism (not shown) for raising and lowering the seat 22 and backrest 24 as a unit as is well known in the art. The seat post 44 preferably also carries a spring mechanism seat frame (not shown) that enables the occupant to change the seat angle to the horizontal so as to achieve a comfortable position. Furthermore, the mechanism customarily includes a device that enables the angular relationship of the seat and backrest to be varied. Such mechanisms and devices are all well known in the art and the details of such mechanisms are not illustrated. While the chair shown has a pedestal base, it
should be appreciated that the invention is not limited to a chair having such a base, but when the chair is to function as an office or desk chair, such a base is preferred. The backrest may or may not be pivotable to a semi-reclined position, and this motion may be in tandem with the seat so that the two have a fixed angular relationship, or as is ordinarily preferred, the backrest may move with respect to the seat by virtue of a flexible frame yieldingly biased to an erect position. Those features also are well known in the art and their details do not form part of this invention.

The seat 22 carries beneath it a transverse horizontal tubular support 54 that defines a pivotal axis for each of the arm subassemblies 26a and 26b. Each arm subassembly 26 includes a post 60, the lower end 62 of which telescopically receives the tubular support 54 disposed beneath the seat 22. The upper end of the post 60 comprises a sleeve 65 that carries an extendable hand grip 64 telescopically received within the sleeve and that also forms part of the post. The sleeve 65 also carries a bracket 67 adjacent its top which supports an arm pad 68 that provides a comfortable support for the forearm and/or elbow of a person seated in the chair while working at a desk, computer, etc. In the embodiment shown, the rear end 69 of the arm pad 68 is recessed so as to expose the top of the sleeve body 65 to enable the hand grip 64 to be extended upwardly from the body as shown in FIG. 4. The top of the grip 64 may carry a knob 71 to facilitate withdrawing and reinserting the grip with respect to the sleeve 65.

In FIG. 2, the armrest is shown in its position for use as a conventional armrest for the chair occupant with the pad 68 disposed substantially in a horizontal position. The extendable hand grip 64 is shown retracted into the sleeve 65 so as to not interfere with use of the armrest pad as a comfortable arm support.

In FIGS. 1-4, an extension 70 is shown depending from the lower end 62 of the armrest assembly post 60, and a piston rod 140 of cylinder assembly 72 is pivotally connected at its free end 73 to the extension 70. At its other end the cylinder assembly 72 is pivotally mounted to a bracket 74 attached to the underside of the rear portion of the seat frame. In order to pivot the armrest assembly post 60 about the horizontal axis established by the tubular support 54 in the manner suggested in FIG. 4, the resistance imposed on the motion by the piston in the cylinder assembly 72 must be overcome.

The cylinder assembly 72 is shown schematically in FIG. 4A. In the embodiment shown, cylinder 72 is double acting, having a piston 75 carried by the piston rod 140, and a piston bypass 77 is connected to the cylinder interior adjacent both ends. The cylinder 72 and bypass 77 are filled with fluid that may be a gas such as air, or a liquid such as water, oil or other lubricant. An adjustable valve 79 determines the force required to move the piston 75 in each direction within the cylinder. Because in this type of system it is difficult to insure that no liquid leaks from it, air may be the preferable fluid. When the valve is fully open, minimum resistance will be encountered to move the piston as the fluid filling the cylinder and bypass flows relatively freely from one side of the piston to the other, but when the valve opening is reduced, the flow of fluid will be impaired and the greater resistance will be encountered when the piston is moved.

As the piston rod 140 is connected to the armrest post 60 by means of the extension 70 and the opposite end of the cylinder 72 is connected to the seat frame, the load imposed on the post to resist the pivotal motion about the axis of the tubular support 54 may be readily adjusted by means of the valve 79. Moreover, the load is double acting, that is, it resists pivotal motion of the post both toward and away from the backrest.

The exercise performed with the armrest assembly 26 is suggest in FIG. 4 wherein the assembly is shown in its extreme positions. In position A the assembly is shown in its normal position for use as a conventional armrest by the occupant of the chair. That position may also be the rearmost position of the assembly. In position B the assembly is shown in the forwardmost position, and the stroke between the two extreme positions may be approximately 50°. While the stroke suggested is approximately 50°, it should be appreciated that the invention is not limited to that degree of angular motion, and means may be provided to vary the length of the stroke and/or the extreme positions A and B.

The neutral position of the armrest assembly shown in FIG. 1 need not serve as both an exercise exercise position and the armrest use position. By closing the valve 79 the armrest may effectively be locked in any position chosen by the user. In use as exercise apparatus the handles 64 are elevated and the occupant may grip the handles 64 and pivot the posts 60 back and forth toward and away from his/her body between the extreme positions. Because each of the arm posts moves independently of the other, the user may typically exercise with the posts synchronized, that is, moving simultaneously in the same direction, or they may be out of phase 180 degrees, or any other time relationship between them may be selected. When the post handles 64 are pulled back toward the body of the occupant, the exercise uses the latissimus dorsi (outer back) muscle, the trapezius muscle (along the back of the neck), and the major and minor rhomboideus muscle (deep muscles that lie under the trapezius and assist with scapular stabilization). Secondary muscles used during this motion are the biceps and rear deltoid muscles (back and shoulder). This exercise is excellent for posture.

When the post handles are pushed forward (away) from the chest, the major and minor pectoralis (chest) muscles as well as the anterior deltoid (front and shoulder) muscles are exercised. Secondary muscles used in this exercise are the triceps brachii and serratus anterior.

In the embodiment shown the load imposed by the cylinder 72 is substantially equal when the posts are moved forward and away (backward and forward) from the person. The load, however, is not exactly the same because the piston rod is confined to one side of the piston and diminishes the quantity of fluid that must be displaced per inch of piston movement in the direction of the rod as compared to the opposite direction. The valve arrangement may be modified to enable the load to be varied separately for movement in each direction. For example, separate, parallel, one way valve passages may be provided in the bypass, each in turn being controlled by its own valve that would allow fluid to flow more easily to one side of the piston and with more difficulty to the other side. Numerous such arrangements are available. This modification would enable the system to simulate a rowing action.

While in the embodiment illustrated, the armrest pad 68 with the bracket 67 are fixed with respect to the seat
post 60, the pad may be pivotally mounted with respect to the post if it is deemed desirable to move it to a less prominent location when the chair is used for exercise. For example, the bracket supporting the pad may be pivotally mounted on the post 60 so as to enable the pad and bracket to lie against the cylinder 66 when the arm pad is not being used. As another alternative, the height of the handle may be varied by providing the cylinder with a facility for locking the handle at different extended positions. For example, in the embodiment shown in FIG. 4, the height of the handles 64 may be independently adjusted and locked in a selected operative position by means of the latch 73 and series of holes 73a in the lower end of the hand grip. Simply by freeing the latch from the holes, the grip may be moved to the desired position, and then by reconnecting the latch 73 to the another of the holes aligned with it, the grip may be locked in any elevation selected. Other arrangements may also be used to accomplish the same purpose.

[0029] In FIGS. 5-7 the headrest assembly for providing a shoulder press/pull down exercise facility is shown. The headrest assembly generally designated 28 is shown in the drawings to include a headrest 80, support rods 82, a cylinder assembly 84, guide 86 and an enclosure 88, the latter being mounted on the rear surface 90 of the backrest 24 (see FIG. 5). The headrest in the embodiment shown is substantially wider than the upper edge 92 of the backrest 24, and its sides 97 are contoured forwardly to provide lateral support for the head. Hand grips 95 are built into the forwardly contoured sides 97 to enable the occupant to grip the hand rest to perform the overhead lift-pull exercise. The shape of the headrest and slender shape of the upper portion 99 of the backrest also enable the occupant to grasp the headrest even when the headrest is in the lowestmost position in close proximity to the upper edge 92 of the backrest. The gripping facilities 95 may take many different forms but being confined to the back surface preserves the clean look of the chair.

[0030] The height of the cushion may be adjusted to comfortably accommodate the person occupying the chair either for relaxation or for exercise. The adjustment may be made by means of the stop 91 carried on the rods 82. In the embodiment shown, the stop may be raised or lowered by loosening the set screws 93 in the sleeves 101 of the stop through which the rods 82 pass. A lowermost position of the headrest is established by the stop engaging the top of the guide. To raise the "at rest" position of the headrest, the stop 91 is lowered on the rods. The screws 93 are merely representative of the type of fastener that may be used to lock the stop in any chosen position on the rods. Knobs and thumb screws are typical of other fasteners that may be used for the same purpose. Furthermore, other and different arrangements may be used to establish the "at rest" position. Typically that "at rest" position of the headrest may be adjusted over a range of approximately 4 inches to comfortably accommodate persons of different height using the chair.

[0031] The cylinder assembly 84 may be essentially identical to that employed in the armrest assembly 26. The cylinder assembly 84 is double-acting, that is, it restrains movement of the headrest 80, as described below, in both an upward and downward course by virtue of the bypass 98 connected to each end of the cylinder 99 and the fluid flow adjusting valve 102. The cylinder houses a piston 103 movable up and down between the ends of the cylinder, and the piston is connected to piston rod 107. The lower end 107 of the piston rod is connected to plate 109 that also is connected to the lower ends of the rods 82 that carry the headrest 80, so that the rods move together. The upper end 111 of the cylinder 99 is connected by means of its extension 104 to bracket 115 that is carried by the fixed guide 86. Guide 86 is in turn mounted in a fixed position on the backrest of the chair within the enclosure 88. Movement of the headrest 80 either in an upwardly or downwardly direction is opposed by the cylinder assembly 84. A convenient knob forming part of the valve 102 extends out of the enclosure 88 for adjusting the size of the fluid passage through the valve for changing the resistance to movement of the headrest.

[0032] When the headrest is used in a conventional manner to support the head of the chair occupant, the headrest is adjusted for the proper height by the adjustable stop 91 described above. When used as an exercise device, the headrest assembly is placed in a position that enables the occupant of the chair to grasp the grips 95 on the back of the headrest cushion 80 and from that position, the occupant may press the cushion upwardly in the manner of a conventional overhead press exercise, and pulling the headrest down from the raised position is a standard pulldown. The overhead press is an upper body strength exercise. The primary muscles used in the press are the front and side deltoid and pectoralis major. Secondary muscle groups used are the triceps brachii and serratus anterior as well as a number of stabilizing muscles of the shoulder joint. When doing the pulldown exercise, the upper back muscles are strengthened. The primary muscles used are the latissimus dorsi, trapezius and rhomboideus major and minor. Secondary muscles used are the biceps brachii and rear deltoid. It should also be appreciated that the push and pull exercises may be performed with one arm. An additional center handle may be provided in the headrest 80 for that purpose.

[0033] In FIGS. 8-10 a leg apparatus is shown that enables a person seated in the chair to perform leg exercises. The apparatus 30 includes a horizontal tubular member 111 that extends radially outward from the hub 42 of the pedestal base 20, and the tubular member carries a bar 110 having a footrest 112 at its outer end. The free end of the bar 110 is supported by a leg 115 carrying a caster 114. The bar 110 is movable in the tubular member 111 as suggested by the two positions of the footrest 112 and leg 115 shown in FIG. 8. As is evident in FIG. 8, the tubular member 111, and bar 110 will not interfere with the motion of the base 20 of the chair as they are disposed above the plane of the legs 40 of the base, and the leg 115 and caster 114 are radially beyond the ends of the legs 40 of the base. Thus, the pedestal base 20 may turn freely under the leg exercise device. A load is applied to the bar 110 that opposes the bar's movement out of the member 111. That load may be imposed by any number of different mechanisms, such as a tension spring within the tubular member attached between the inner ends of the tubular member and bar, or a cylinder and piston connected between the member and bar, or any similar such device. In the embodiment shown, a peg 116 is also illustrated, that may be used to lock the bar 110 in a fixed radial position with respect to the tubular member so that the footrest 112 may serve as a comfortable rest for the chair occupant. For adjustability, a number of holes may be provided in the bar to receive the peg. The leg exercise
provided by the apparatus is achieved by moving the feet essentially in a horizontal plane away from the axis of the base. When the pressure is relieved, the spring, air cylinder or other mechanism used will retract the bar.

[0034] When not being used for exercise, the leg exercise apparatus may readily be detached from the base of the chair. As shown in FIGS. 9 and 10 the inner end 117 of the tubular member 111 is connected to the hub 42 by means of a pin 118 and anchor 120 and the appropriate holes 122 and 124 provided in the member 111 and anchor. By simply pulling the pin the member can be separated from the chair. However, the leg exercise assembly may remain connected to the chair as it will roll about with the pedestal base and will provide comfort to the occupant of the chair as a footrest.

[0035] The leg press exercise afforded by the footrest assembly 30 involves extending the legs away from the body. That exercise involves the quadriceps and hamstring muscles and the gluteus maximus, and builds lower body strength.

[0036] Yet another exercise facility is provided on the chair. In FIGS. 5 and 8, handles 128 are shown provided on the sides of the backrest 24. These also may be used as a stretching exercise while seated in the chair. The handles 128 are intended to be grasped by the hand of the occupant reaching across the mid-line of his/her body from the opposite side. When the arm reaches across the body to grasp the handle 128 on the opposite side, a stretch is initiated in the following muscles: posterior deltoid (back of shoulder), supraspinatus, infraspinatus, teres minor and teres major (these are the muscles that make up the rotator cuff), trapezius, rhomboideus major, rhomboideus minor and the latissimus dorsi. Similar exercise may be performed by providing handle on the side edges of the seat 22, as also suggested in FIG. 2.

[0037] Having thus described several aspects of this invention, it is to be appreciated that various alterations, modifications, and improvements will readily occur to those skilled in the art. Such alterations, modifications, and improvements are intended to be part of this disclosure, and are intended to be within the spirit and scope of the invention. Accordingly, the foregoing description and drawings are by way of example only.

What is claimed is:

1. A chair capable of functioning as a conventional chair and as an exercise station comprising:
   a seat and back assembly,
   an arm assembly mounted adjacent each side of the seat and each having a handle,
   said arm assemblies each including an arm post extending upwardly from the seat and carrying an arm cushion for supporting the arm of an occupant of the chair,
   a support for each arm assembly enabling each to move back and forth on the side of the seat,
   a control for each arm assembly, said controls including a piston and cylinder assembly mounted beneath the level of the seat and having a piston rod connected to the arm assembly causing the piston to move back and forth in the cylinder when the arm assembly moves back and forth on the side of the seat,
   a passage connected to the cylinder on each side of the piston and forming a closed fluid filled system with it, and
   a valve means in the passage for altering the ability of the fluid to flow from one side to the other of the piston through the passage to vary the resistance to movement of the arm.

2. The chair as defined in claim 1 wherein an overhead press and pulldown assembly is attached to the back, said overhead assembly including a movable grip disposed above the back in position to be engaged by both hands of an occupant of the chair,
   a piston cylinder assembly mounted on the chair and having a piston rod connected to the grip and connected to the piston in the cylinder,
   a passage connected to the cylinder on each side of the piston, said cylinder and passage forming a closed loop with fluid filling the cylinder and passage,
   and a valve in the passage for adjusting the ability of fluid to pass from one side of the piston to the other in the cylinder to vary the force required to raise and lower the grip.

3. The chair as defined in claim 1 wherein the arm assembly includes a height adjustment for the handle to be grasped by the chair occupant to move the arm assembly.

4. The chair as defined in claim 1 wherein each arm assembly includes income for enabling the resistance to movement of each arm to be adjusted independently of the other.

5. The chair as defined in claim 3 wherein the handle for each arm assembly is mounted on the arm post and movable to a position above the arm cushion.

6. The chair as defined in claim 2 wherein the movable grip of the overhead push and pull assembly is part of a headrest for supporting the head of an occupant seated in the chair.

7. A chair suitable for use both as a conventional executive desk chair and exercise station comprising:
   a pedestal base carrying a chair frame including a seat and backrest and a center seat post providing a swivel support for the seat,
   a pair of arm assemblies for the chair each including an arm post, said arm posts extending upwardly from the seat and each being pivotally mounted for movement independently of each other about a horizontal axis connected to the lower portion of the posts,
   each arm assembly having a grip in position to be grasped by the hand of an occupant of the seat for moving the arm assembly toward and away from the occupant,
   and a motion control piston and cylinder connected between the arm assembly and the chair frame for imposing a variable load on the pivotal motion of the arm post about said axis.

8. A chair suitable for use both as a conventional executive desk chair and exercise station comprising:
   a base carrying a chair frame including a seat and backrest and a center seat post providing a swivel support for the chair frame,
a headrest assembly mounted on the chair frame and having a head cushion above the top of the backrest and extending from side-to-side of the chair frame and beyond the sides of the top portion of the backrest.

a piston forming part of the headrest assembly extendable vertically on the backrest and carrying the head cushion for substantially vertical movement toward and away from the top of the backrest, said piston imposing a yieldable and variable resistance to the vertical movement of the headrest,

and gripping means forming part of the headrest and proximate the shoulders of an occupant of the seat for applying a pushing and a pulling force on the head cushion.

9. The chair as defined in claim 7 wherein the horizontal axis is substantially transverse to the seat enabling each arm post to pivot front and back in an essentially vertical plane.

10. The chair as defined in claim 9 wherein the grip is extendable from the top of the arm post.

11. The chair as defined in claim 10 wherein the motion control is disposed below the seat.

12. The chair as defined in claim 7 wherein the arm posts are connected to opposite ends of a bar that defines a pivotal axis and extends from side-to-side of the chair and beneath the seat.

13. The chair as defined in claim 8 wherein the head cushion is movable between a lower position close to the top of the backrest and an elevated position several inches above the top of the backrest.

14. The chair as defined in claim 8 wherein the gripping means is on the back of the head cushion.

15. The chair as defined in claim 8 wherein the backrest has a rigid frame on its back surface and the piston is mounted on the rigid frame.

16. The chair as defined in claim 1 wherein handles are mounted on the sides of the backrest for enabling a person seated in the chair to perform stretching exercises by reaching across his/her midline to grasp the handle on the opposite side of the backrest.

17. The chair as defined in claim 6 wherein handles are mounted on the sides of the backrest for enabling a person seated in the chair to perform stretching exercises by reaching across his/her midline to grasp the handle on the opposite side of the backrest.

18. A chair suitable for use both as a conventional chair and exercise station comprising;

a seat and backrest assembly,

a headrest assembly mounted on the seat and backrest assembly and having a head cushion above the top of the backrest and extending from side-to-side of the chair and beyond the sides of the top portion of the backrest,

a piston forming part of the headrest assembly extendable vertically on the backrest and carrying the head cushion for substantially vertical movement toward and away from the top of the backrest, said piston imposing a yieldable and variable resistance to the vertical movement of the headrest,

and gripping means forming part of the headrest and proximate the shoulders of an occupant of the seat for applying a pushing and a pulling force on the head cushion.

19. The chair as defined in claim 7 wherein a legrest/leg exerciser is attached to the base and extends radially outwardly from the base, said exerciser including a generally horizontal member having a footrest at its radially outer end and supported by a roller at said outer end,

and a retracting means attached to the member urges the outer end radially inwardly toward the base.

20. The chair as defined in claim 19 wherein the legrest/leg exerciser is detachably connected to the base.

21. The chair as defined in claim 19 wherein the fluid is gas.

22. The chair as defined in claim 2 wherein the fluid used in each of the cylinders is gas.