Aug. 1, 1967 J. T. MATTHEWS 3,333,811

ROCKER MECHANISM

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Fig. 1.

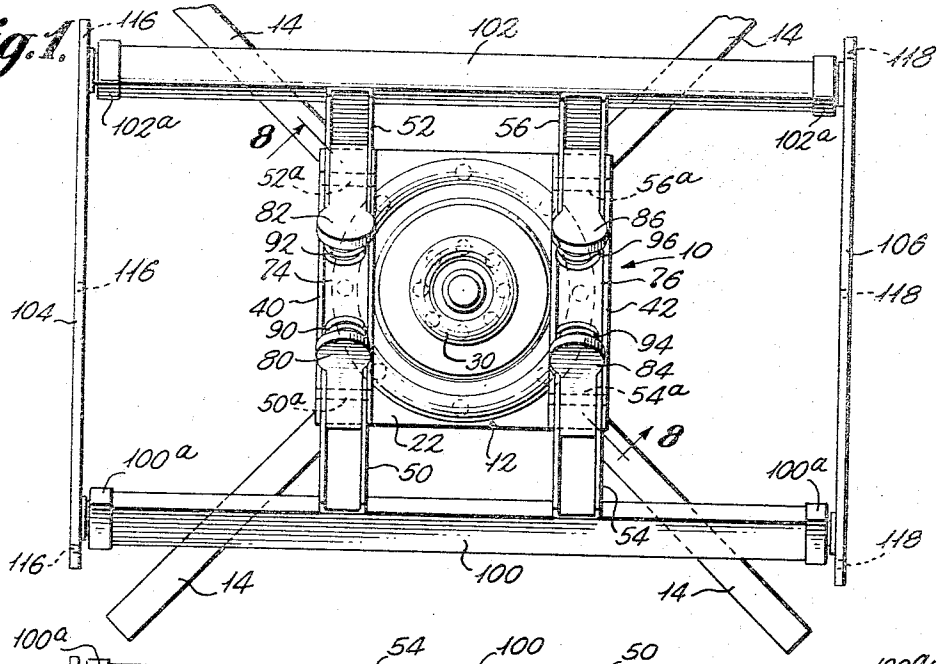

Fig. 2.

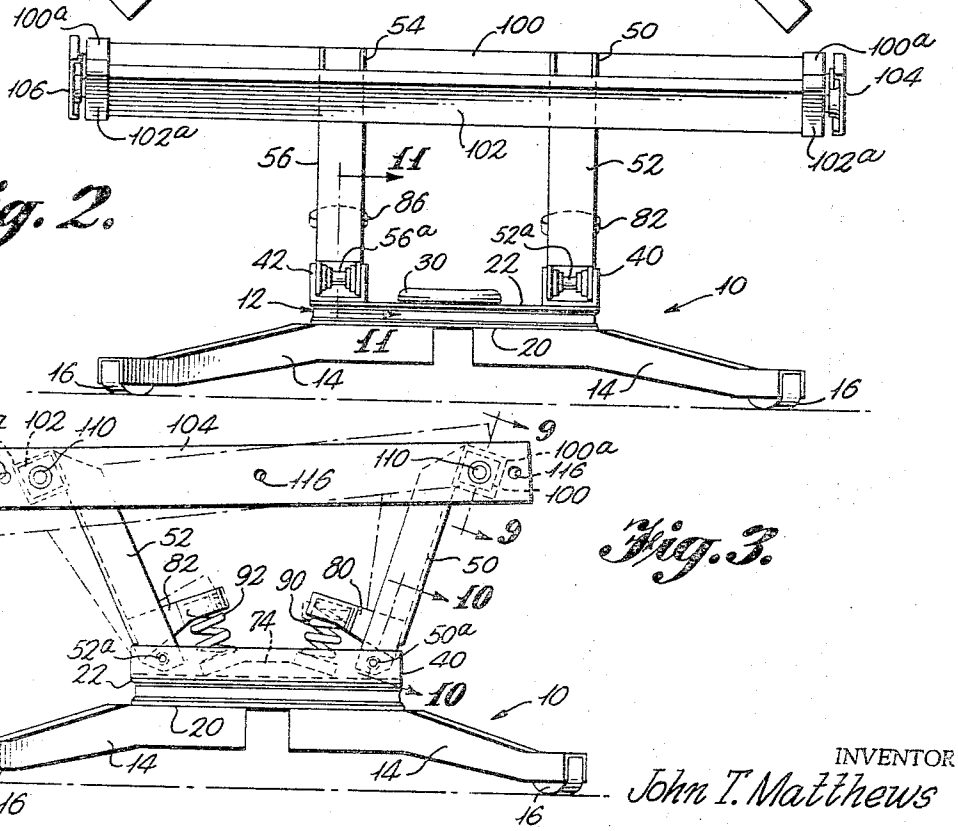

Fig. 3.

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Fig. 4.

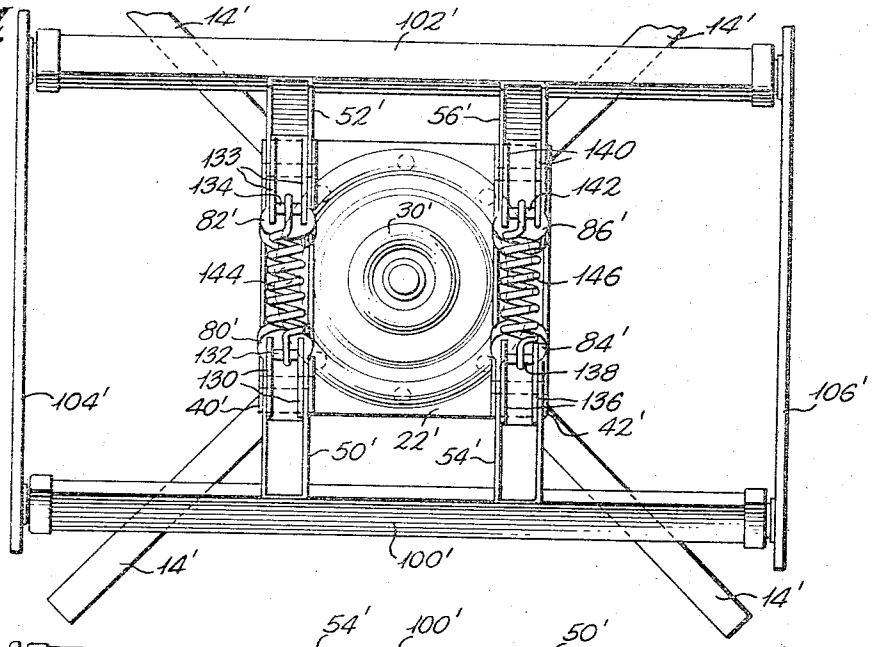

Fig. 5.

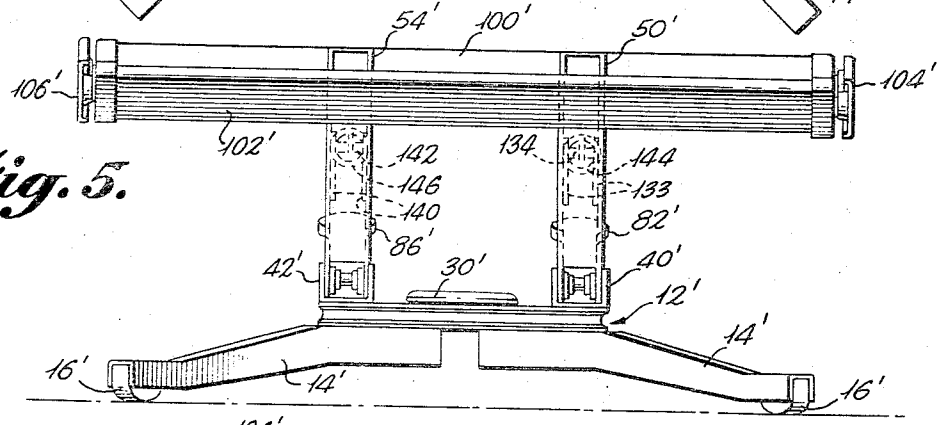

Fig. 6.

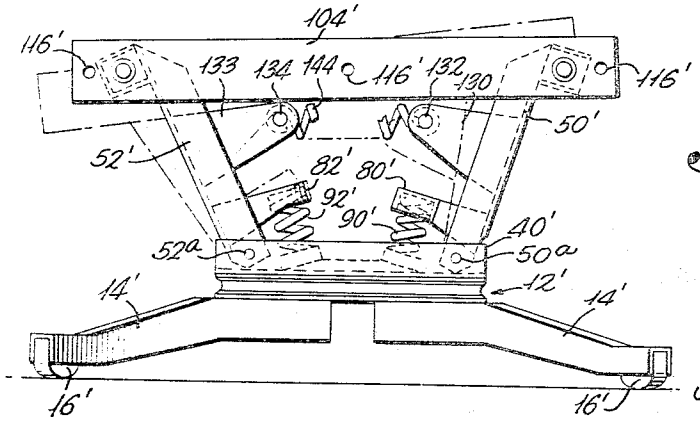

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Fig. 7.

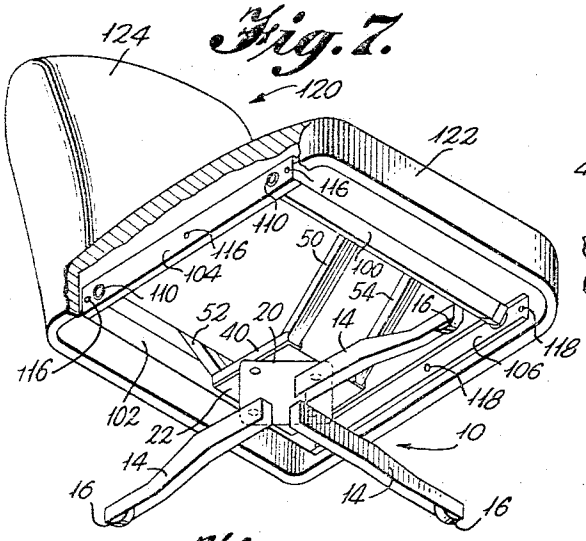


Fig. 8.

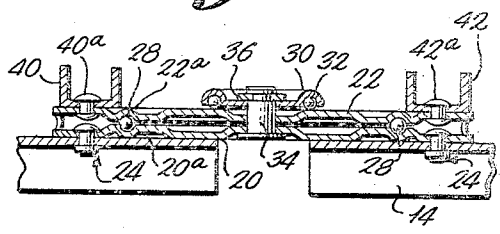


Fig. 9.

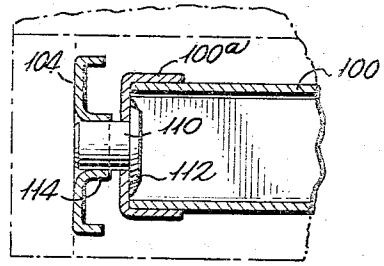


Fig. 12.

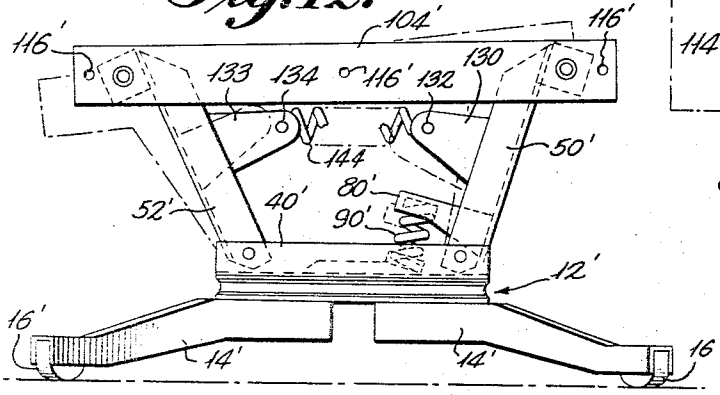


Fig. 10.

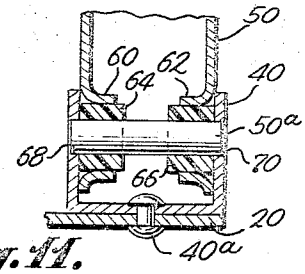
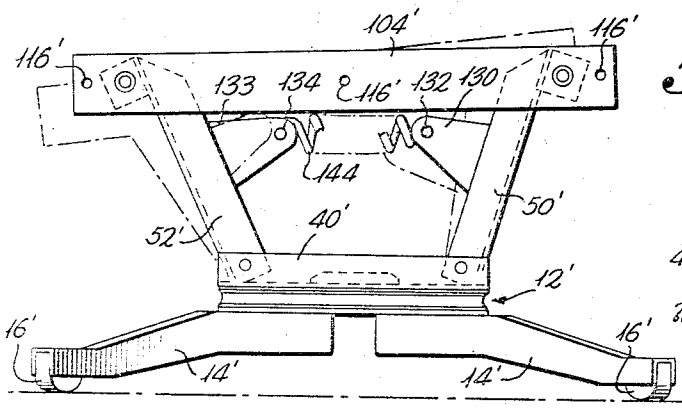


Fig. 11.



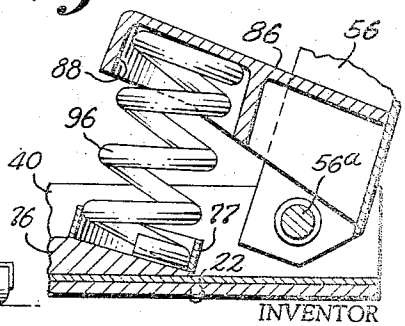


Fig. 13.

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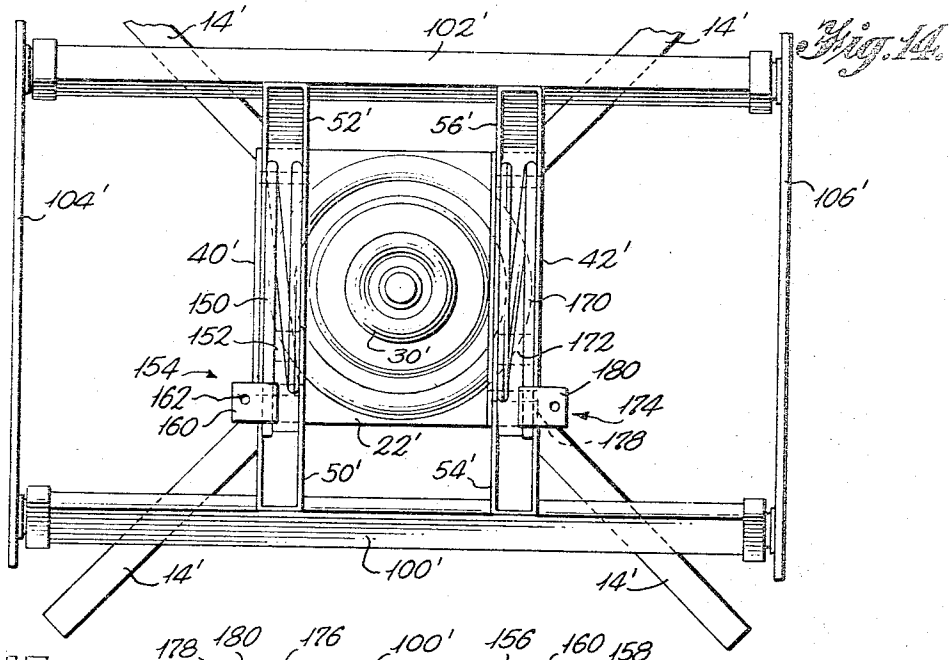

Fig. 14.

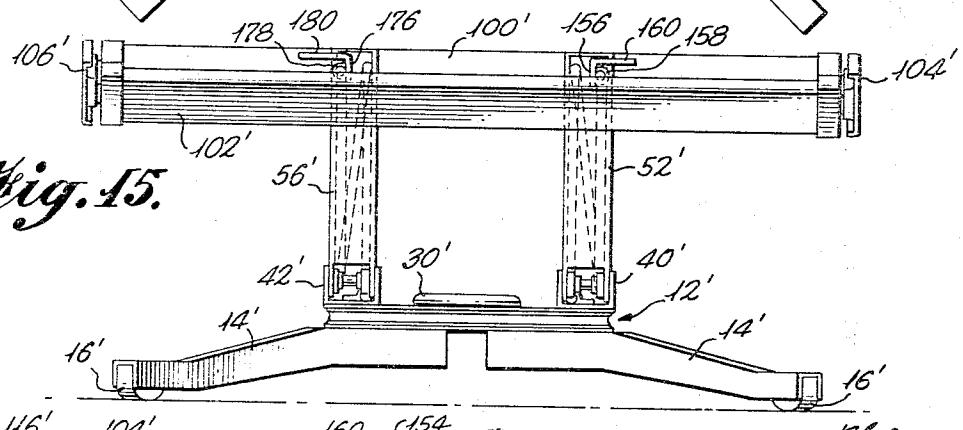

Fig. 15.

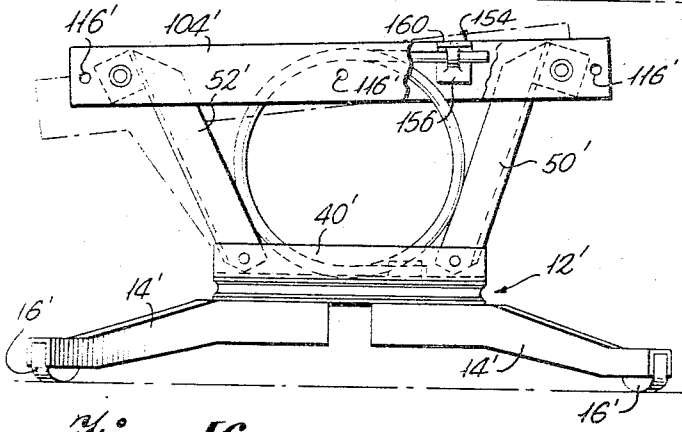

Fig. 16.

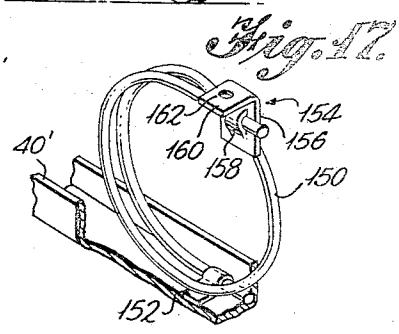

Fig. 17.

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United States Patent Office 3,333,811 Patented Aug. 1, 1967

3,333,811

ROCKER MECHANISM

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Filed Sept. 7, 1965, Ser. No. 485,188
14 Claims. (Cl. 248—376)

The present invention relates to new and novel rocker mechanism, and more particularly to rocker mechanism for use with chairs or seat structures.

The rocker mechanism of the present invention is particularly adapted for use with chairs or seats such as office chairs and the like. The rocker mechanism is so designed as to normally bias the mechanism into a desired neutral position and to facilitate rocking movement when so desired by a person occupying the structure supported by the rocker mechanism itself.

In order to accomplish these desired results, the rocker mechanism of the present invention incorporates a unique structure wherein a plurality of support arms are pivotally connected with a base means, and a support framework is operatively associated with the support arms, the support framework including pivotally supported side member means for supporting a seat or the like. The base means, the support arms and the support framework are preferably formed of a rigid metallic material so as to provide a very strong and durable construction.

Unique resilient means is operatively associated with the rocker mechanism so as to normally bias the over-all mechanism into a neutral position. This resilient means may take different forms, and in various modifications of the invention, compression spring means, tension spring means and torsion spring means as well as certain combinations of these spring means are employed.

A special advantage of the arrangement of the rocker mechanism of the present invention is the fact that it can be utilized with different types of base means. This enables maximum versatility since the support arms can be pivotally supported on any suitable type of base means and any conventional supporting leg arrangement. In particular, the rocker mechanism of the present invention may be associated with a base means which is a swivel arrangement so that the over-all combination provides a swivel rocker which is highly desirable in office chairs or similar articles of furniture.

The construction of the present invention is quite compact, employs a minimum of parts, is relatively inexpensive to manufacture and substantially trouble-free in operation. At the same time, the arrangement is quite sturdy and rugged in construction so as to readily withstand loads applied thereto in normal use.

The support framework connected with the support arms of the structure enables any suitable means to be supported on the rocker mechanism, and in a typical example a seat structure is shown as supported on the support framework, although it will be understood that any other suitable means may be supported thereon if so desired.

An object of the present invention is to provide new and novel rocker mechanism which is particularly adapted for use with chairs or seats such as office chairs and the like.

Another object of the invention is the provision of rocker mechanism which may be employed with different types of supports and which can be particularly combined with a swivel base means to provide a swivel rocker arrangement.

Still another object of the invention is to provide rocker mechanism employing novel resilient means to bias the mechanism to a neutral position and to facilitate rocking movement when in use.

A further object of the invention is to provide rocker mechanism which is quite compact, employs a minimum of parts, is relatively inexpensive in construction, is substantially trouble-free in use, and yet which is quite sturdy and rugged and reliable in operation.

Other objects and many attendant advantages of the invention will become more apparent when considered in connection with the specification and accompanying drawings, wherein:

FIG. 1 is a top view of a first form of the invention;

FIG. 2 is a rear view of the structure shown in FIG. 1;

FIG. 3 is a side view of the structure shown in FIG. 1;

FIG. 4 is a top view of a modified form of the invention;

FIG. 5 is a rear view of the structure shown in FIG. 4;

FIG. 6 is a side view of the structure shown in FIG. 4;

FIG. 7 is a bottom perspective view of an office chair employing the structure shown in FIGS. 1–3 inclusive;

FIG. 8 is a sectional view taken substantially along line **8—8** of FIG. 1 looking in the direction of the arrows;

FIG. 9 is a sectional view taken substantially along line **9—9** of FIG. 3 looking in the direction of the arrows;

FIG. 10 is a sectional view taken substantially along line **10—10** of FIG. 3 looking in the direction of the arrows;

FIG. 11 is a sectional view taken substantially along line **11—11** of FIG. 2 looking in the direction of the arrows;

FIG. 12 is a side view of a further modification of the invention;

FIG. 13 is a side view of still another form of the invention;

FIG. 14 is a top view of a still further modified form of the invention;

FIG. 15 is a rear view of the structure shown in FIG. 14;

FIG. 16 is a side view of the structure shown in FIG. 14 with a part thereof broken away for the sake of clarity; and

FIG. 17 is a top perspective view of a portion of the structure shown in FIGS. 14–16 and partly broken away to illustrate the manner of mounting one of the torsion springs of the structure.

Referring now to the drawings wherein like reference characters designate corresponding parts throughout the several views, a first modification of the invention is illustrated in FIGS. 1–3 and 7–11 inclusive. In this modification, the base means is indicated generally by reference numeral **10** which includes a swivel means indicated by reference numeral **12** and supported by a plurality of leg members **14** shown as being four in number and each being of a generally channel shaped configuration. Suitable glide members **16** or other well known types of support members can be employed with the leg members for supporting them on a support surface.

The swivel means **12** may be of a construction as shown for example in U.S. Patent No. 2,779,642 and as particularly illustrated in FIG. 9 of such patent. The swivel means includes a pair of plates **20** and **22**, the lower plate **20** being suitably secured to the leg members **14** as by nut and bolt assemblies indicated by reference numerals **24**. The plates **20** and **22** are shown as being of generally square configuration, although any suitable shape may be employed. The plates are provided with corner openings, the nut and bolt assemblies **24** extending through the corner openings in plate **20** and suitably aligned openings provided in the leg members.

The plates **20** and **22** are provided with bearing races or channels **20***a* and **22***a* respectively, these channels re-

ceiving a plurality of bearing balls **28** which are maintained in suitable spaced relationship by a cage structure as set forth in the aforementioned patent.

A plate **30** of circular configuration has a downwardly facing annular raceway which receives a plurality of bearing balls **32**, plate **30** as well as the plates **20** and **22** all being held in operative relationship by means of a rivet stud **34** and a collar or washer **36**, the upper end of the stud being swaged over to hold the assembly in the assembled relationship shown in FIG. 8.

The base means includes a pair of base members **40** and **42** each of which is of channel-shaped configuration, being open at the top and defining a cross sectional configuration which is generally rectangular. The two base members **40** and **42** are fixed in spaced relationship to one another on the upper plate **22** and may be secured in position by suitable fastening means such as rivets **40***a* and **42***a* respectively which extend through openings provided in the corners of the plate **22** and suitable aligned openings provided in the base members.

Support arm means comprises four separate and independent support arms indicated by reference numerals **50**, **52**, **54** and **56**, each of these arms being of generally channel-shaped cross sectional configuration and of similar construction. The two support arms **50** and **52** are pivotally supported by base member **40**, the arms being mounted for pivotal movement about pivot pins **50***a* and **52***a* respectively, and the other two arms **54** and **56** are pivotally supported by base member **42** for pivotal movement about pivot pins **54***a* and **56***a* respectively. Since the construction of each of the arms is identical, and the manner of pivotally mounting each of the arms is similar, a description of the particular manner of mounting one of the arms will suffice for all.

Referring now to FIG. 10, the manner of pivotally supporting arm **50** is illustrated. The opposite leg portions of the channel-shaped arm **50** are provided with inwardly directed integral flange portions **60** and **62** which snugly receive and support bearing members **64** and **66** which may be formed of any suitable non-friction material such as nylon or the like. These bearing members **64** and **66** each have a central bore formed therethrough, the bores in the bearing members being aligned with holes **68** and **70** provided in the opposite leg portions of the channel-shaped associated base member. It is apparent that the pivot pin **50***a* extends through the aligned holes and bores and serves to pivotally support the support arm on the associated base member.

Spring support members **74** and **76** as seen most clearly in FIG. 1 are supported at an intermediate portion of the base members **40** and **42** respectively, these spring support members serving to support the springs hereinafter described.

The various support arms **50**, **52**, **54** and **56** include laterally extending portions **80**, **82**, **84** and **86** respectively which are adapted to engage the spring members associated therewith for biasing the support arms in a particular direction. The construction of each of these portions **80**, **82**, **84** and **86** is the same, and accordingly, a detailed description of one of them will suffice for all.

Referring now particularly to FIG. 11, the laterally extending portion **86** of arm **56** includes a downwardly facing cup-shaped portion **88** which receives the upper end of a compression spring **96**, the lower end of this compression spring being retained within a cup-shaped portion **77**, secured to member **76**. It is apparent that this arrangement will securely retain the compression spring in operative position, and the compression spring will normally tend to bias the support arm **86** in a clockwise direction as seen in FIG. 11 about the pivot axis defined by pivot pin **56***a*.

Similar springs **90**, **92** and **94** are operatively associated with the arm portions **50**, **82** and **84** respectively, it being understood in each case that the upper end of each of these separate compression springs is received

and retained in a downwardly facing cup-shaped portion, the lower end of each of the springs being received in a cup-shaped retainer provided on one of the spring support means **74** or **76**. With this arrangement, each of the support arms is biased in a particular direction about its associated pivot axis.

As seen in FIG. 3, it will be understood that arm **50** will be biased in a clockwise direction as will the arm **54** immediately therebehind in this view, while arm **52** and the arm **56** immediately therebehind in this view will be biased in a counterclockwise direction as seen in this particular figure.

As seen most clearly in FIG. 1, the support framework supported at the upper end of the support arms includes a first pair of frame members **100** and **102**. Each of these members is of tubular construction and may for example be generally square in cross sectional configuration. Frame member **100** is rigidly secured as by welding or the like to the upper ends of the arms **50** and **54**. The frame member **102** is rigidly secured to the upper ends of arms **52** and **56**.

The opposite ends of the tubular members **100** and **102** are closed by cap members **100***a* and **102***a* respectively, these cap members serving as means for pivotally supporting the side members **104** and **106** of the support framework. It will be noted that each of members **104** and **106** is pivotally connected at spaced portions thereof with the two frame members **100** and **102**. Since the construction of the pivotal interconnection between each of the frame members and each of the side members of the support framework is identical, a description of the detailed construction of one will suffice for all.

Referring particularly to FIG. 9, a support stud includes a cylindrical shank portion **110** extending through a suitable opening provided in cap member **100***a*, and having formed thereon an enlarged head **112** which is suitably secured as by welding to the inner surface of the cap member. The associated side member **104** is provided with an integral flange portion **114** which defines a bearing portion which snugly receives the shank portion **110**. It is evident that this arrangement provides a pivotal interconnection between the side member and the associated frame member.

As seen most clearly in FIGS. 1, 3 and 7, side member **104** is provided with a plurality of spaced holes **116**, and side member **106** is provided with a plurality of spaced holes **118**, these holes being employed for securing a suitable means thereto which is to be supported by the rocker structure. As shown in FIG. 7, the means supported on the rocker mechanism comprises a chair structure indicated generally by reference numeral **120** and including a seat portion **122** and a back rest portion **124**. It will be understood that the seat portion **122** is suitably secured to the side members **104** by suitable fastening means as is conventional in the art. It will also be noted in FIG. 7 that one of the leg members has been removed for the sake of illustration.

Referring now to FIGS. 4 through 6 inclusive, a modified form of the invention is illustrated, and in this form of the invention, the base means, support arms, and support framework are substantially identical with the previously described modification and have been give the same reference numerals primed. The only difference in the construction shown in FIGS. 4 through 6 inclusive is in the provision of additional resilient spring means for urging the rocker mechanism into a neutral position and for facilitating the rocking action when in use. It will be noted that in this latter modification, four compression springs are employed just as in the previously described modification.

In addition to the same structure as employed in the first modification, this latter modification includes a pair of bracket members **130** extending from arm **50'** and supporting a pin member **132** at the outer ends thereof. Similar bracket members **133** are secured to arm **52'** and

support a pin **134** at the outer ends thereof. A pair of bracket members **136** secured to arm **54'** support a pin **138**, and a similar pair of bracket members **140** secured to arm **56'** serve to support a pin **142** at the outer ends thereof.

A first tension spring **144** has the opposite ends thereof secured to pins **132** and **134**, and a second tension spring **146** has the opposite ends thereof connected to pins **138** and **142**. It is apparent that these tension springs will tend to pull the associated arms toward one another and in cooperation with the aforedescribed compression springs will bias the rocker structure to a neutral position and assist in maintaining a proper rocking action when in use.

Referring now to FIG. 12 of the drawings, a still further modified form of the invention is illustrated, parts similar to those shown in FIG. 6 having been given the same reference numerals. A comparison of FIG. 12 with FIG. 6 of the drawings reveals that substantially the identical construction is provided with the exception that in the modification shown in FIG. 12, the two projecting portion **82'** and **86'** and the associated compression springs **92'** and **96'** have been eliminated in this form of the invention. In other words, the construction shown in FIG. 12 is identical with that shown in FIG. 6 except that in the modification shown in FIG. 12, the compression springs normally biasing arms **52'** and **56'** in a counter-clockwise direction have been eliminated.

The other spring means employed in the modification shown in FIG. 12 are identical with those shown in FIG. 6, or in other words a pair of compression springs **90'** and **94'** are provided for normally biasing arms **50'** and **54'** in a clockwise direction about the pivot pins thereof and a pair of tension springs **144** and **146** serve to bias arms **50'** and **52'** toward one another and arms **54'** and **56'** toward one another respectively.

Referring now to the modification shown in FIG. 13, it will be noted that here again the structure is similar to those previously described in that the base means, the support arm structure and the support framework are substantially identical with the first described modification. The parts shown in FIG. 13 similar to those shown in FIG. 12 have been given the same reference numerals. In the structure shown in FIG. 13, the only difference from that shown in FIG. 12 is the fact that all of the compression springs have been eliminated so that the sole resilient means provided in ths form of the invention is the tension spring means **144** and **146**. In other words, in the modification shown in FIG. 13, a first tension spring is provided for biasing arms **50'** and **52'** toward one another, and a second tension spring is provided for biasing the other pair of arms **54'** and **56'** toward one another.

This resilient biasing means as employed in FIG. 13 will also serve to bias the support arms and the rocker structure to a neutral position and will facilitate rocking action when in use as in each of the previous modifications.

Referring now to FIGS. 14 through 17, a still further modified form of the invention is illustrated. In this modification as in the others, the base means, the support arm structure and the support framework is substantially identical with the first described form of the invention and similar parts have been given the same reference numerals primed. In this latter modification, a modified form of spring means is employed wherein torsion springs are utilized for biasing the rocker mechanism to a neutral position and for assisting in providing the proper rocking action.

A first torsion spring **150** is provided, and as seen particularly in FIG. 17, the lower end of the torsion spring is secured within base member **40'** by means of a clamping member **152**. An angle member bracket **154** is secured to the upper end of the torsion spring.

Bracket member **154** includes a first leg **156** having an integral offset portion **158** which receives the upper end of the torsion spring. A second leg member **160** is provided with a hole **162** therethrough for securing the bracket member to a suitable portion of the seat structure or the like which is supported on the framework.

A second torsion spring **170** has the lower end thereof secured to the base member **42'** by means of a clamping member **172**.

An upper bracket **174** is similar to bracket **172** and includes a first leg portion **176** having an integral offset portion **178** for receiving the upper end of the torsion spring. A second leg portion **180** has a hole **182** formed therethrough for securing the bracket member to a suitable portion of the supported seat structure or the like.

It is apparent that the torsion springs in this modification will function in a manner so as to accomplish the same purpose as the compression springs or tension springs in the previously described modifications in biasing the rocker mechanism to a neutral position and assisting in providing a proper rocker action when in use.

It is apparent from the foregoing that there is provided according to the present invention new and novel rocker mechanism which is particularly adapted for use with chairs or seats such as office chairs and the like. It will be noted as seen for example in FIG. 3 that when the rocker mechanism is in its neutral position, the forward or right-hand portion of the support framework will be disposed slightly above the rear or left-hand portion of the framework such that the over-all support framework slopes from the rear portion thereof upwardly toward the forward portion thereof. This provides the usual desired neutral position of the associated chair structure. The resilient means in each form of the invention serves to bias the rocker mechanism to its neutral position so that the support framework is in the desired relationship, and the resilient means will facilitate proper rocking of the structure when in use. It is apparent that the rocker mechanism of the present invention can be employed with different types of supports, and is particularly adapted for use with a swivel structure to give a swivel rocker arrangement. The rocker mechanism is quite compact, employs a minimum of parts, is relatively inexpensive to manufacture, is substantially trouble-free, and yet at the same time is quite sturdy and rugged and reliable in operation.

As this invention may be embodied in several forms without departing from the spirit or essential characteristics thereof, the present embodiment is therefore illustrative and not restrictive, and since the scope of the invention is defined by the appended claims, all changes that fall within the metes and bounds of the claims or that form their functional as well as conjointly cooperative equivalents are therefore intended to be embraced by those claims.

I claim:

1. Rocker mechanism comprising base means including a pair of base members disposed in fixed spaced relationship to one another, four separate and independent support arms, a pair of support arms being pivotally interconnected at the lower ends thereof with spaced portions of each of said base members, a support framework connected with and supported by the upper ends of said support arms, said support framework including pivotally supported means for connection with means to be supported, and spring means for biasing the rocket mechanism to a neutral position, said spring means being operatively connected with each pair of support arms interconnected with one of said base members, each of said spring means being disposed between the associated pair of arms.

2. Apparatus as defined in claim **1** wherein each of said spring means is supported by one of said base members at a point disposed between the pivotal interconnection of the lower ends of the associated arms with the associated base member.

3. Apparatus as defined in claim 2 wherein said spring means associated with each of said pairs of support arms comprises a pair of compression springs, each of said compressions springs engaging portions on the lower part of one of said arms for biasing the associated arm in one direction about the pivotal interconnection thereof with the associated base member.

4. Apparatus as defined in claim 3 including tension spring means connected between the arms of each of said pairs of arms above said compression spring means operatively connected with the associated arms, said tension spring means normally tending to bias the upper ends of said arms in a direction opposite to that in which the arms are biased by the associated compression spring means.

5. Apparatus as defined in claim 1 wherein said spring means includes compression spring means operatively associated with each of said pairs of support arms, each of said compression spring means being supported by the associated base member between the points of pivotal interconnection of the associated pair of support arms with the associated base member, each of said compression spring means engaging a portion on the lower part of only one of the arms of the associated pair of support arms, said spring means also including tension spring means connected between the arms of each pair of support arms for biasing the upper ends of the arms of each of said pairs of support arms toward one another.

6. Apparatus as defined in claim 1 wherein said spring means comprises a tension spring means operatively connected between the arms of each of said pairs of support arms for biasing the upper ends of the arms of each of said pairs of support arms toward one another.

7. Apparatus as defined in claim 1 wherein said spring means comprises a pair of torsion spring means, each of said torsion spring means having one end thereof connected with and supported by one of said base members at a point between the pivotal interconnections of the associated pair of support arms with the associated base member, the opposite end of each of said torsion spring means being connected with said support framework.

8. Rocker mechanism including base means, a plurality of separate and independent support arms each of which is pivotally supported by said base means, resilient means for biasing the rocker mechanism into a neutral position, and a support framework supported by each of said support arms, said support framework including a first pair of frame members rigidly connected with said support arms, said framework including a second pair of members each of which is pivotally interconnected with each of said frame members.

9. Rocker mechanism including base means, a plurality of separate and independent support arms each of which is pivotally interconnected with said base means, resilient means for biasing the rocker mechanism into a neutral position, there being at least four support arms, a support framework supported by said support arms, said support framework including a pair of frame members each of said frame members being rigidly connected with a pair of support arms, said framework also including a pair of side members each of which is pivotally connected at spaced points thereof with said pair of frame members.

10. Rocker mechanism comprising base means including a pair of base members disposed in fixed spaced relationship to one another, four support arms, two support arms being pivotally connected with spaced portions of one of said base members, two other support arms being pivotally connected with spaced portions of the other of said base members, resilient means for biasing said rocker mechanism into a neutral position, a support framework connected with and supported by said support arms, said support framework including a first pair of frame members, each of said frame members being rigidly connected with the upper ends of a pair of said support arms, said support framework including a pair of side members, each of said side members being pivotally interconnected at spaced points thereof with said frame members.

11. Apparatus as defined in claim 10 wherein each of said frame members is rigidly interconnected with a support arm pivotally interconnected with different ones of said base members.

12. Rocker mechanism comprising base means including a pair of base members disposed in fixed spaced relationship to one another, four separate and independent support arms, a pair of support arms being pivotally connected with spaced portions of each of said base members, four separate compression spring means, each of said compression spring means being disposed between said base means and one of said support arms for normally biasing each support arm in one direction about the pivot axis thereof, a support framework connected with and supported by said support arms, said support framework including a first pair of frame members each of which is rigidly connected with a pair of said support arms, said support framework including a pair of spaced side members each of which is pivotally connected at spaced portions thereof with said pair of frame members.

13. Rocker mechanism comprising base means including a pair of base members disposed in fixed spaced relationship to one another, four separate and independent support arms, a pair of support arms being pivotally interconnected with spaced portions of each of said base members, four separate compression spring means, each of said compression spring means being disposed between said base means and one of said arms for normally biasing each of said arms in one direction about the pivot axis thereof, and a pair of tension spring means, each of said tension spring means being connected between the support arms pivotally supported by one of said base members, a support framework including a first pair of frame members each of which is rigidly connected with a pair of said support arms, said support framework also including a pair of side members each of which is pivotally interconnected at spaced portions thereof with said frame members.

14. Rocker mechanism comprising base means including a pair of base members disposed in fixed spaced relationship to one another, four separate and independent support arms, a pair of support arms being pivotally interconnected with spaced portions of each of said base members, a pair of torsion spring means, each of said torsion spring means being connected with one of said base members and being adapted to bias the rocker mechanism into a neutral position, and a support framework connected with and supported by said support arms, said support framework including a pair of frame members each of which is rigidly connected with a pair of said support arms, said support framework including a pair of side members each of which is pivotally interconnected at spaced portions thereof with said frame members.

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