Dec. 1, 1953 W. H. MURPHY 2,661,227

PIVOT FOR CHAIR ARMS OR THE LIKE

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Fig. 1.

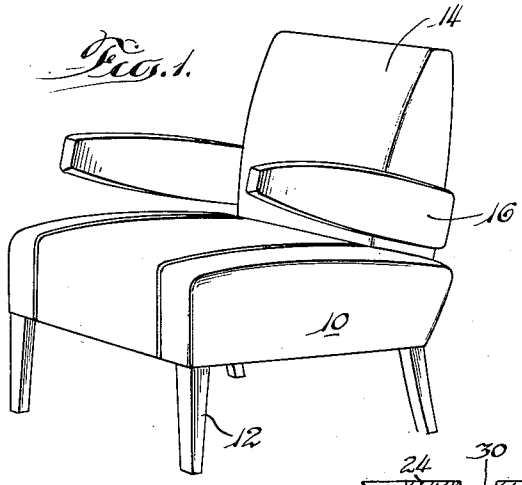


Fig. 2.

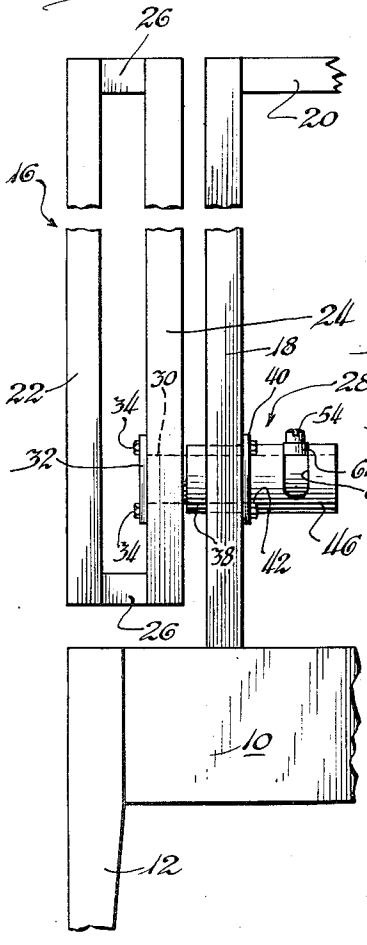
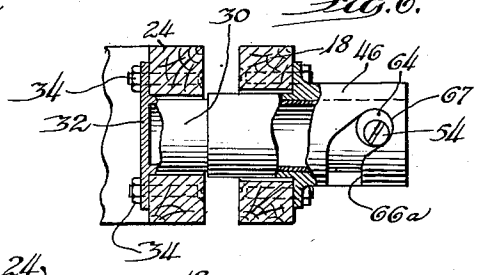


Fig. 6.



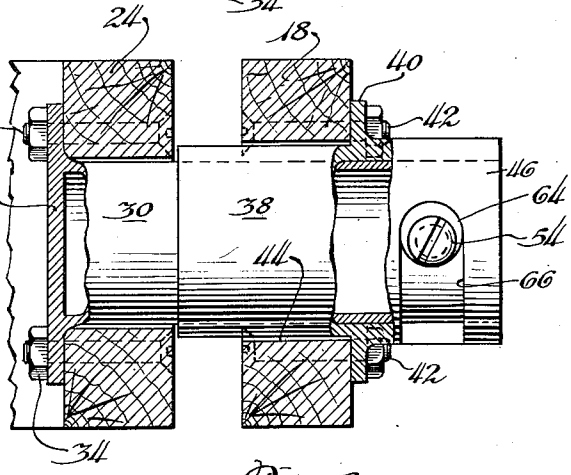


Fig. 3.

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Fig. 4.

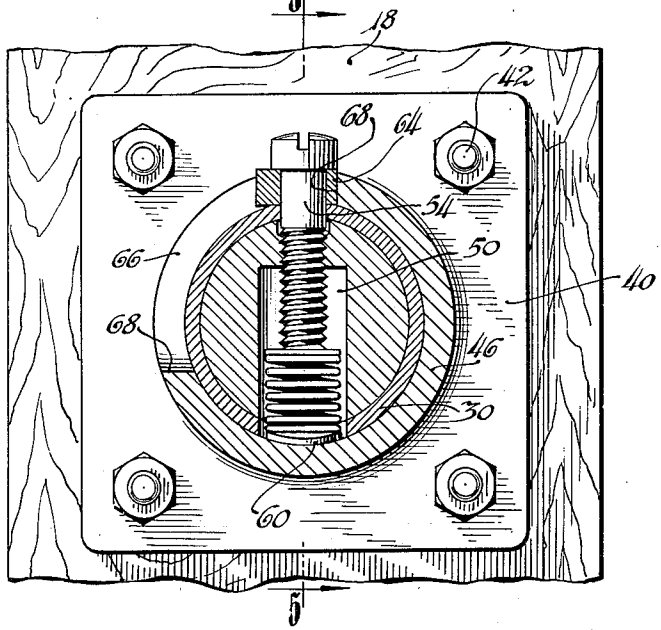
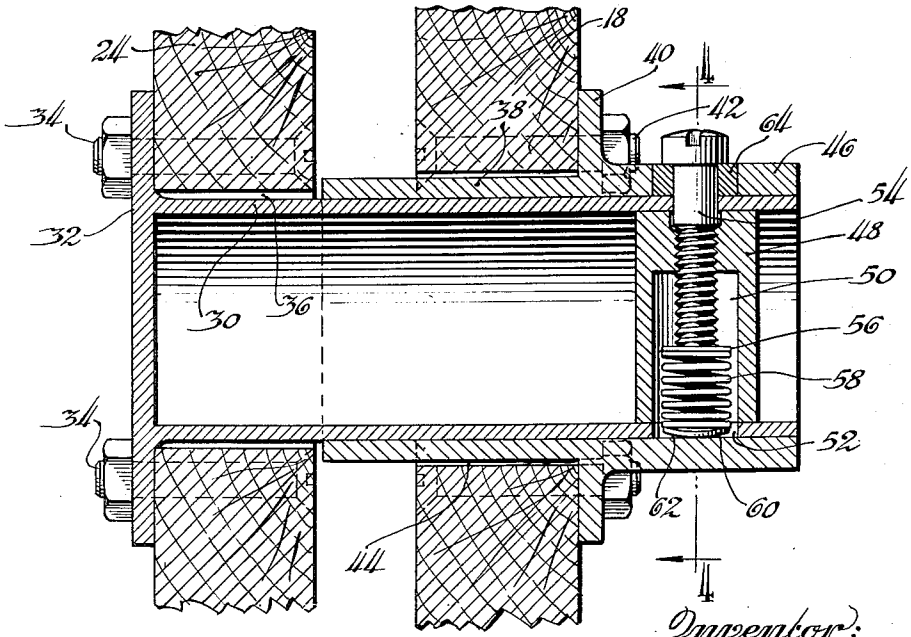


Fig. 5.



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PIVOT FOR CHAIR ARMS OR THE LIKE

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14 Claims. (Cl. 287—93)

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The present invention relates to a pivot structure and more particularly to a pivot which, although it has other uses, is intended primarily as the mounting member for a pivoting arm of a chair or similar article as will become apparent presently.

In my copending application Serial No. 759,207 filed July 5, 1947 for "Convertible Chair" I have shown a chair which has arms which pivot either into a horizontal position or which may be rotated backwardly so as to align with the back of the chair so that several such chairs may be used side by side to form a davenport or like article. Since the sole support for such an arm is the pivot structure it will be apparent that the pivot must have great rigidity in order to prevent the arm from loosening, wobbling or breaking off if someone sits upon it or if it is otherwise subjected to misuse.

It is therefore one of the objects of the present invention to provide a novel pivot structure which fulfills all the requirements of such a device when used for pivoting an arm to the main portion of a convertible piece of furniture.

An additional object is to provide a novel chair arm pivot of the type described which has great strength and rigidity, which is arranged so that the upper and lower limits of movement of the arm may be readily adjusted, which provides a frictional drag such that the arm will move smoothly from one position to the other without apparent looseness, and which facilitates assembly of the arms to the chair.

Still another object is to provide a device of the above character which can be manufactured at reasonable cost.

Other objects and advantages will become apparent from the following description of a preferred embodiment of my invention which is illustrated in the accompanying drawings, in which:

Fig. 1 may be considered as a left front perspective view of a chair of the type in which use of the present invention is particularly advantageous;

Fig. 2 is a view taken from the front of the right-hand portion of the chair with the upholstery stripped away so as to show the framework of the chair and the arm as well as the pivot member for joining the arm to the chair frame;

Fig. 3 is a top view of the pivot member drawn to larger scale than in Fig. 2 with portions of the structure broken away so as to reveal additional details of construction;

Fig. 4 is a transverse sectional view and may be considered as taken in the direction of the arrows substantially along the line 4—4 of Fig. 5;

Fig. 5 is a vertical longitudinal sectional view

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which may be considered as taken in the direction of the arrows along the line 5—5 of Fig. 4; and

Fig. 6 is a view similar to Fig. 3 but showing an alternative form of the invention.

Referring particularly to Fig. 1 of the drawings it will be seen that the chair there shown comprises a base or seat portion 10 which is connected to legs 12 and a back 14. The back is narrower than the seat portion and at each side is equipped with arms 16 which are shown in the conventional position. These arms, however, may be pivoted upwardly and backwardly so as to lie in the same plane as the back 14. This is achieved as is shown generally in Fig. 2 wherein it will be perceived after the upholstery has been stripped away that there is an upwardly extending side rail 18 which forms one edge of the back 14 and that the top end of this rail is connected to the similar rail at the opposite side by a cross member 20. The arm 16 comprises an outer wooden rail 22 connected at its outer and inner ends to a similar inner rail 24 by means of blocks 26. The arm 16 is connected to the side member 18 of the chair by a pivot assembly indicated generally by the numeral 28.

By referring particularly to Figs. 2 to 5 it will be seen that the pivot member includes a tubular shaft 30 having a flange 32 at one end, the flange being secured to the arm side rail 24 by means of bolts and nuts 34. The structure is so oriented in the example shown that the flange is mounted against the inner face of the inner side rail 24 of the arm with the tubular shaft 30 extending through a hole 36 in the arm rail. This tubular shaft extends across the intervening space between the arm rail 24 and the side member 18 of the chair and passes into a tube 38 equipped with a flange 40 at an intermediate point, this flange similarly being fastened to the side member 18 by bolts 42. In the structure shown the flange 40 bears against the inner face of the side member 18 while the tubular bearing sleeve 38 extends through an opening 44 with its outer end closely adjacent to the arm side rail 24, the opposite end of the tubular sleeve extending away from the flange 40 to form a portion 46 which has a purpose to be described presently and which together with the outwardly extending portion 38 of the tubular sleeve gives this sleeve a sufficient length and a sufficient bearing area against the tubular shaft 30 to provide great strength in resisting any motion of the shaft 30 and sleeve 38 relative to each other than rotational motion or endwise motion. In other words, it prevents the arm from rocking or otherwise becoming loose.

Near the end of the portion 46 of the sleeve the tubular shaft 30 is closed internally with a

comparatively thick disk 48 which may be pressed into place or otherwise secured therein. This disk 48 has a generally cylindrical cavity 50 extending thereinto in a radial direction from its edge, this opening being in alignment with a similar opening 52 of substantially identical size through the side wall of the tubular shaft 30. The depth of the opening 50 in the example shown is considerably more than half the diameter of the disk, as is best seen in Figs. 4 and 5.

At the opposite side of the disk 48 the remaining portion of the wall beyond the end of the cavity 50 is drilled and threaded so as to receive a cap screw 54. As shown in Figs. 4 and 5 the inner end of the cap screw 54 bears against a metal disk 56 disposed within the cavity 50 and which in turn rests against one end of a coil spring 58, the opposite end of which bears against the inner face of a metal disk 60 having a bowed outer face 62. The total length of the spring 58 and disks 56 and 60 is somewhat less than the length of the cavity 50 including the length of the passage 52 in alignment therewith. It is clear, therefore, that when the cap screw 54 is retracted, the spring will be free and the rotational and longitudinal movement of the tubular shaft relative to the sleeve 38 will be uninhibited. However, when the cap screw 54 is tightened into the position shown in Figs. 4 and 5 the inner end thereof will depress the disk 56 so as to compress the spring 58 considerably. The spring, therefore, urges the bowed face 62 of the disk 60 against the inner surface of the tubular sleeve 38 with considerable force. The result is that the frictional engagement between the bowed face 62 and the inner surface of the tubular element 38 acts in a braking capacity so that a positive and appreciable force must be applied to the end of the arm of the chair in order to rotate the shaft 30 relative to the tube 38 in either direction. Further, the arm will remain in whatever position it is set.

The cap screw 54 passes through an opening in a circular button 64 so disposed that when the cap screw is tightened this button is clamped by the head of the screw against the side wall of the tubular shaft 30. The button 64 fits within an arcuate slot 66 formed through the side wall of the portion 46 of the sleeve 38. This arcuate slot 66 is somewhat more than 90 degrees long, its actual length depending upon the diameter of the button 64 and the angular relationship between the position of the arm 16 when in the down position and when in the up position. If it is assumed that this angular relationship is, for instance, 90 degrees, then the slot 66 should be 90 degrees long plus a length at each end equivalent to half the diameter of the button 64. The cap screw 54 and button 64 in conjunction with the ends 68 of the slot 66 therefore act as stops to limit rotational movement of the arm 16 between its upper and lowermost position. Also, since the button 64 has a width only slightly less than the slot 66 these members act to prevent any endwise movement of the arm relative to the main portion of the chair.

It has been found that in constructing chairs of this type slight misalignment may occur between different chairs made according to the same specifications. For instance, when a particular arm is pivoted into the rearward position so as to act as a continuation of the back member 14 it may be found that the arm will lie either slightly behind or slightly ahead of the back

14. In order to accommodate the arm pivot for such inaccuracies in manufacture the hole for the cap screw 54 which extends through the button 64 is eccentrically located. This is best seen in Fig. 4. This provides a means for varying the position of the stop, as will be pointed out presently.

When manufacturing the chair the tubular shaft 30 is secured to the arm 24 by means of the bolts 34 while the tubular bearing sleeve 38 is attached to the inner rail 18 of the chair as a separate member. When the subassembly lines for the arms and the main portions of the chair meet, the tubular shaft 30 is slipped into the end of the bearing sleeve 38 and pushed inwardly to the position shown in Fig. 5. Just prior to this assembly operation the disk 56, the spring 58 and the disk 60 are inserted together into the pocket 50 so that as soon as the end of the shaft 30 has been pushed into the end of the tubular sleeve 38 a short distance these members will be retained within the cavity 50, although since the spring 58 is not compressed they will not inhibit the inward movement of the shaft relative to the sleeve. At this step in the assembly operation the back flap of upholstery on the back 14 has not yet been secured so it is possible to drop the button 64 into the slot 66 and to pass the cap screw 54 through the button and into the threaded opening at the edge of the disk 48. The cap screw is thereafter driven in with a screw driver until it has almost reached its maximum inward position in which it clamps the button 64 tightly against the side of the tubular shaft 30. Just before this clamping action takes place the arm 16 is rotated backwardly until it aligns properly with the back portion 14. The button 64 is then rotated about the shank of the cap screw 54 until because of its eccentricity a portion of the button edge is brought against the end 68 of the slot 66. When this position has been reached the cap screw 54 is tightened so as to lock the button 64 in place. The chair is completed by tacking into place the flap of upholstery which covers the rearward surface of the back 14.

It will be seen that a pivot constructed as shown and described provides a very rigid mounting for the arm and that further it provides an adjustable stop for limiting movement of the arm as desired and for adjusting the arm to the proper initial position and that further the pivot has a braking action to place a frictional drag upon its operation and that in addition this frictional engagement does not take place until near the end of the final assembly operation so that it does not interfere with this assembly.

With some types of upholstery material, particularly where the nap is heavy, moving the arm 16 upwardly and downwardly has a tendency to wear off the nap upon the adjacent surfaces of the arm and the chair back. For this reason in some instances I prefer to use the arrangement shown in Fig. 6. In this embodiment of the element all of the parts are similar and are numbered identically, with the exception that the slot 66 in the previously described embodiment which was straight has been replaced by a slot 66a which is straight throughout the major portion of its length but has its ends curved outwardly so as to stand away from the arm of the chair at an oblique angle, thus forming the obliquely offset portions 67. The slot is so disposed that when the button 64 is seated at the end of the slot 67 the arm will be inward against

the edge of the back in either the up or down position, both ends of the slot being formed similarly. However, as soon as the arm is rotated so as to move it away from either the lowermost or uppermost position the button 64 is cammed toward the straight portion of the slot 66a with the result that the arm is shifted bodily outwardly away from the chair back a sufficient distance to prevent substantial wear upon the upholstery material. As soon as the arm reaches the opposite end of its slot it is cammed inwardly so as to bring the adjacent surfaces of the upholstery material tightly together.

While I have described a preferred embodiment of my invention it will be aparent to those skilled in the art that variations may be made therefrom without departing from the spirit and scope of the invention and that therefore the invention is to be measured by the appended claims.

Having described my invention, what I claim as new and useful and desire to secure by Letters Patent of the United States is:

1. A pivot of the type described comprising a sleeve adapted for attachment to one member and a shaft rotatably fitted thereto adapted for attachment to a second member to be secured in pivoting relation to the first member, said sleeve having a slot in the side wall thereof, means including a threaded member extending through said slot and into said shaft for limiting rotation of said shaft relative to said sleeve, structure in said shaft having a pocket formed therein in substantial alignment with said threaded member, means to rotate said threaded member and thereby to advance the inner end thereof into said pocket, said pocket extending into said shaft from the cylindrical wall thereof opposite said slot and surrounding the inner end of said threaded member and said shaft having an aperture aligned with said pocket, a brake shoe in the aperture in said shaft aligned with said pocket adapted for frictional engagement with the inner wall of said sleeve, and a resilient member disposed in said pocket between said brake shoe and the end of said threaded member such that when said threaded member is tightened said resilient member is compressed and presses said brake shoe against the wall of said sleeve.

2. A pivot of the type described comprising a sleeve adapted for attachment to one member and a shaft rotatably fitted thereto adapted for attachment to a second member to be secured in pivoting relation to the first member, said sleeve having a slot in the side wall thereof, a stop member comprising a disk shaped button disposed within said slot and having an axially extending hole therethrough, and a cap screw extending through the hole in said button and into an internally threaded opening in said shaft for clamping said button to said shaft, said hole in said button being eccentrically located so that rotary adjustment of the button effects endwise adjustment of the sleeve with respect to the shaft.

3. A pivot of the type described comprising a sleeve adapted for attachment to one member and a shaft rotatably fitted thereto adapted for attachment to a second member to be secured in pivoting relation to the first member, said sleeve having a slot in the side wall thereof, a stop member comprising a projection fixed to said shaft and extending into said slot, and said slot extending generally circumferentially and being formed so that the center line thereof is curved near its end so as to cause endwise reciprocation of said shaft relative to said sleeve as said shaft is rotated relative to said sleeve.

4. A pivot of the type described comprising a sleeve adapted for attachment to one member and a shaft rotatably fitted thereto adapted for attachment to a second member to be secured in pivoting relation to the first member, said sleeve having a slot in the side wall thereof, a stop member comprising a circular disk-shaped button in said slot having an eccentric hole therethrough, a cap screw extending through the hole in said button and anchored in said shaft for clamping said button to said shaft when said cap screw is tightened, said slot extending generally circumferentially and being formed so that the center line thereof is curved near its end so as to cause endwise reciprocation of said shaft relative to said sleeve as said shaft is rotated relative to said sleeve.

5. A pivot of the type described comprising a pair of tubular sleevelike members, one of which is adapted for attachment to one member and the other of which is adapted for attachment to a third member, said tubular members being relatively rotatable to permit pivotal movement of said tubular members, means for guiding and limiting relative rotational movement therebetween comprising a circumferential slot in one of said tubular members and an adjustable stop member fixed to the other tubular member and projecting into said slot, and means for restraining relative rotational movement between said tubular members comprising a spring pressed brake shoe means including a spring mounted in one of said tubular members, an aperture extending through the side wall of said other tubular member, and means for both locking said stop member and compressing said spring thereby to project said brake shoe means through said aperture into frictional engagement with the side wall of the other member.

6. A pivot of the type described comprising a sleeve adapted for attachment to one member and a shaft rotatably fitted thereto adapted for attachment to a second member to secure said members for relative pivotal movement, said shaft having diametrically opposed bores through the side wall thereof open to each other, a portion of one of said bores being internally threaded, said sleeve having a slot in the side wall thereof, a stop member disposed within said slot and comprising a circular disk-shaped button having an aperture extending eccentrically therethrough, a cap screw extending through the aperture in said button and into threaded engagment with said internally threaded bore for clamping the button in position when said screw is tightened, and means for restraining relative movement between said shaft and sleeve comprising a brake shoe in the other of said apertures in said shaft engaging the inner wall of said sleeve, and a resilient member between said brake shoe and said cap screw adapted to be compressed when said cap screw is tightened.

7. A pivot of the type described comprising a sleeve adapted for attachment to one member and a partially hollow shaft rotatably fitted thereto adapted for attachment to a second member to secure said member for relative pivotal movement, said sleeve having a slot in the side wall thereof, a stop member disposed within said slot and comprising a disk-shaped button

having an aperture extending therethrough upon an eccentric axis, diametrically opposed apertures in said shaft, a cap screw extending through the aperture in said button and one of the apertures in said shaft, an anchor block conformed to engage at least a portion of the inner wall of said shaft and having a centrally located abutment formed thereon in a plane transverse to the shaft, said block having a threaded aperture in which said cap screw is engaged for anchoring said button, a brake shoe in the other aperture in said shaft in frictional engagement with the inner wall of said sleeve, resilient means having a relaxed length less than the distance from said abutment to the outer edge of said last mentioned aperture, said resilient means being engaged by said cap screw when the latter is tightened for compressing the spring.

8. A pivotal connection comprising opposed telescopically arranged relatively pivotable members, structure in one of said members having a threaded bore therein extending radially of the said member, said latter member having an aperture axially aligned with said bore, a circumferentially extending slot in the other member of less than 360° in extent, a disc having a diameter corresponding substantially to the width of said slot and an axially extending aperture, a screw extending through the aperture in said one member and threaded in said bore to anchor said disc in said slot, said aperture in said disc snugly receiving the shank of said screw and being eccentric to the axis of said disk so that an end point of pivotal movement of one of said members with respect to the other member may be varied by rotary adjustment of the disc relative to the screw.

9. A pivotal connection comprising telescopically arranged relatively pivotable first and second members, means to limit relative pivotal movement of said members comprising a segmental slot in the first member, a disc having a diameter corresponding substantially to the width of said slot and an axially extending bore, and means fixed adjacent one end in said second pivotable member and extending through the bore in said disc adjacent its opposite end for anchoring said disc in said slot, said bore in said disc being eccentric to the center thereof so that the coextensive portions of said relatively pivotable members may be increased or decreased by rotary adjustment of the disc.

10. A pivotal connection comprising opposed telescopically arranged relatively pivotable members, a slot circumferentially segmental with respect to the axis of relative rotation in one of said members, structure extending radially from the other member into said slot including a part conforming in width to the width of said slot to control relative endwise movement of said relatively pivotable members and engageable with the ends of said slot to limit relative pivotal movement of said pivotable members, said part of said radially extending structure in said slot being of circular cross section and adjustable upon an eccentric axis which is eccentric relative to the center of said part to change the relative telescopic relationship of said pivotable members.

11. A pivotal connection comprising a telescopically arranged relatively pivotable shaft and sleeve, said shaft having diametrically opposite apertures and said sleeve having a segmental slot, fixed structure in said shaft having an opening extending diametrically therethrough in alignment with the apertures in the shaft, stop means

anchored in the opening in the fixed structure in said shaft and extending through one of the opposed apertures in the latter and including a part engaged in said slot adapted to cooperate with the sides of said slot to control relative endwise movement of said shaft and sleeve and with the ends of the slot to limit relative pivotal movement of the sleeve and shaft, a brake shoe in the other of the diametrically opposed openings in said shaft, and a spring in the opening in said fixed structure between said brake shoe and the inner end of said stop means placed under compression when the stop means is in operative position for causing said brake shoe frictionally to restrain relative pivotal movement of said sleeve and shaft.

12. A pivotal connection comprising a telescopically arranged relatively pivotable shaft and sleeve, said shaft having diametrically opposite apertures and an open chamber therebetween, fixed structure in said shaft having a bore aligned with the opposed apertures in said shaft and including a threaded portion adjacent one aperture in said shaft, a screw having screw threaded engagement with the threaded portion of said bore, a brake shoe in the second of the opposed apertures, and a spring in the bore in said fixed structure between said brake shoe and the inner end of said screw placed under compression by turning up the screw for causing said brake shoe frictionally to restrain relative pivotal movement of said sleeve and shaft.

13. A pivotal connection comprising a telescopically arranged relatively pivotable shaft and sleeve, means forming a pocket in said shaft, opening through the periphery of the shaft along a portion thereof which is coextensive with the sleeve, a brake shoe in said pocket, a compression spring in said pocket and means for compressing said spring against said brake shoe for causing the latter frictionally to engage the inner periphery of said sleeve and restrain relative pivotal movement of said sleeve and shaft.

14. A pivot of the type described comprising a sleeve adapted for attachment to one member and a partially hollow shaft rotatably fitted thereto adapted for attachment to a second member to be secured in pivoting relation to the first member, said sleeve having a slot in the side wall thereof, a stop member comprising a circular disk-shaped button disposed within said slot and having an off-center hole therethrough, a cap screw extending through the hole in said button and through an internally threaded opening in said shaft for clamping said button to the shaft when said screw is tightened, a pocket in said shaft in substantial alignment with and surrounding the inner end of said screw, said shaft having an aperture forming a continuation of said pocket, a brake shoe in said aperture adapted for frictional engagement with the inner wall of said sleeve, and a resilient member disposed in said pocket between said brake shoe and the inner end of said screw, such that when said screw is tightened to clamp said button said resilient member is compressed and presses said brake shoe against the wall of said sleeve.

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