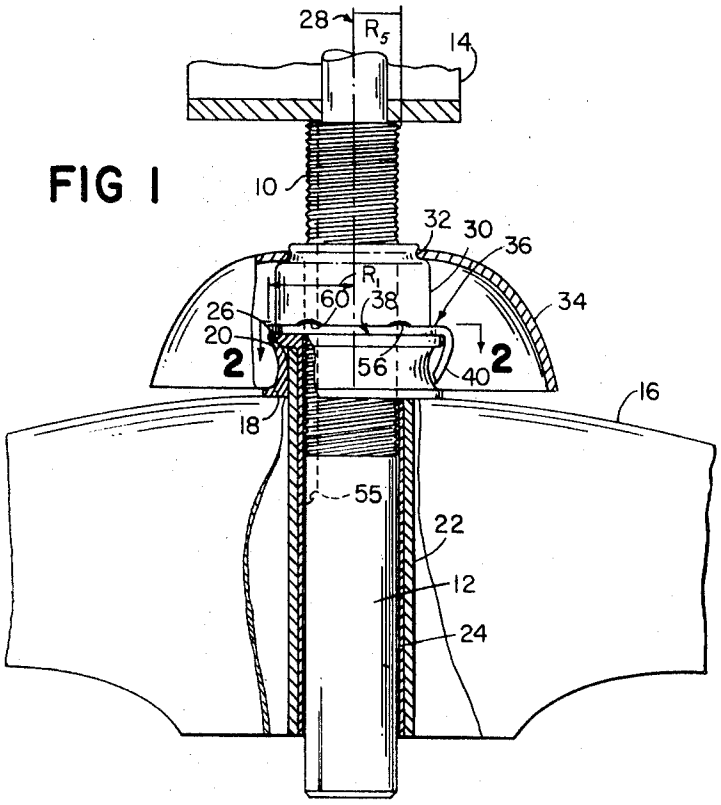
Sept. 20, 1971 R. W. PRESCOTT 3,606,234

RELEASABLE SWIVEL CHAIR SUPPORT CONSTRUCTION

Filed Feb. 24, 1970 2 Sheets-Sheet 1

FIG 1



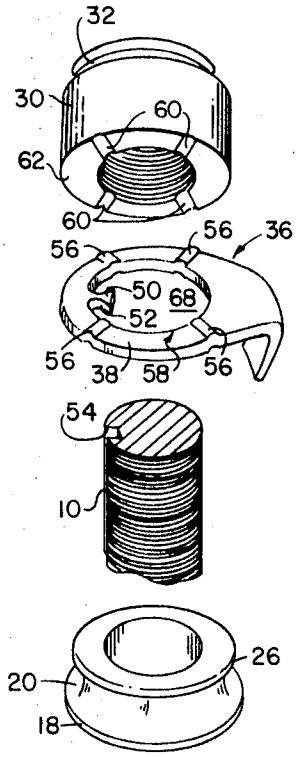


FIG 4

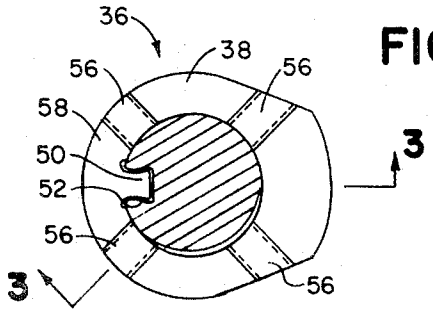


FIG 2

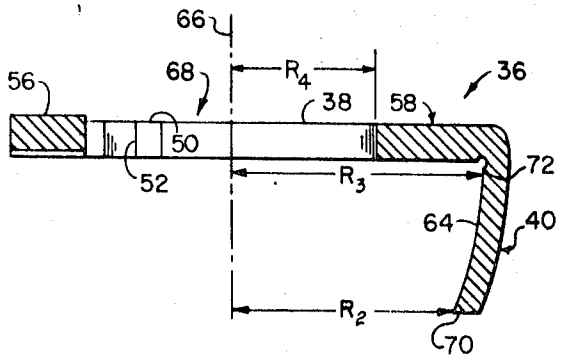
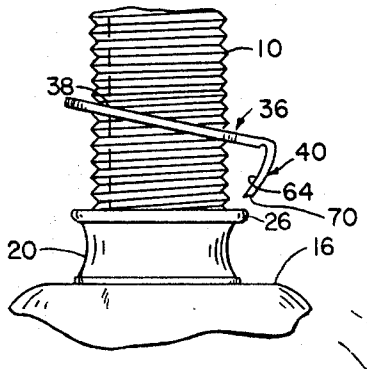


FIG 3

RELEASABLE SWIVEL CHAIR SUPPORT CONSTRUCTION

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FIG 5



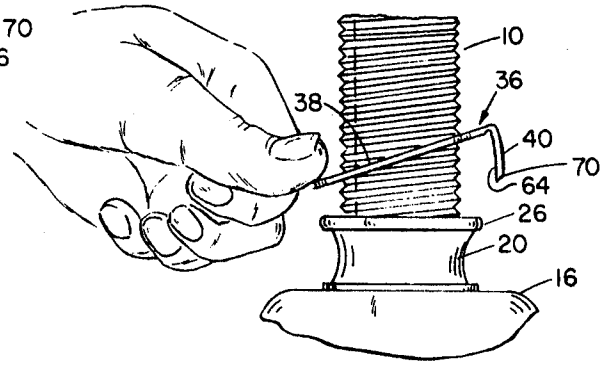


FIG 6

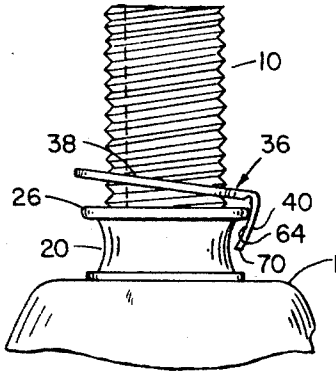


FIG 7

United States Patent Office 3,606,234 Patented Sept. 20, 1971

3,606,234

RELEASABLE SWIVEL CHAIR SUPPORT CONSTRUCTION

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Int. Cl. F16m 13/00
U.S. Cl. 248—406 7 Claims

ABSTRACT OF THE DISCLOSURE

A swivel chair support construction employs a spindle with one end adapted to be attached to a chair seat and a portion of the spindle being threaded for a sufficient distance to provide vertical adjustability over the position of the chair to the desired extent, a tubular member receiving the spindle in loose sliding engagement and adapted to be secured to a chair base and including a load bearing element, a load supporting nut threadedly engaged on the spindle, and means for releasably connecting together the spindle and tubular member to prevent axial separation thereof when the chair is lifted. The means includes a hook having an arcuate portion extending around at least a major portion of the periphery of the spindle adjacent the tubular member and an arm fixed to and extending from the hook toward the tubular member and terminating in a free end which is arranged to be free from engagement with the tubular member when the hook is cocked in one direction on the spindle to displace the free end of the arm away from the spindle and to engage a portion of the tubular member to prevent separation of the hook from the tubular member when the hook is cocked in the opposite direction on the spindle.

This invention relates to a swivel chair support construction of the threaded spindle type in which a seat height adjustment handwheel, or "bell," is used, and more particularly to a novel and improved construction for connecting the spindle to the base or leg assembly of the chair.

Typically, such swivel chair support constructions employ a fitting secured to the upper end of the spindle and arranged to be attached to a variety of chair seats. Preferably, the spindle has an unthreaded lower portion to provide a smooth cylindrical bearing surface arranged to cooperate with a smooth tubular recess in the leg assembly to minimize wear of the spindle and recess while supporting the chair, and a threaded upper portion on which the bell is threaded for use in adjusting the height of the chair.

In practice, the spindle and its upper end fitting, with or without a bell mounted in place, is permanently secured to the chair seat. This sub-assembly is then adapted to be mounted on any of a wide variety of leg assemblies, depending upon the style and color desired. In some constructions the bell must be threaded on the spindle before the latter is secured to the chair seat, while in others, as shown for example in U.S. Pat. No. 3,161,396 the bell may be placed or may be interchanged with another bell after the spindle is secured to the chair seat.

In either event, the sub-assembly of chair seat and spindle must then be adapted to be releasably and interchangeably mounted on a variety of leg assemblies to provide the desired choice of style and color combinations. After the chair is completely assembled, the spindle and chair seat must be so connected to the leg assembly that the entire chair can readily be lifted and moved from place to place simply by grasping the chair seat, without affecting the height adjustment or separating the chair from the leg assembly. One commonly employed means

of accomplishing this is to provide a set screw in the bell in position to engage beneath a flange or collar at the top of the leg assembly, but this is unsightly and difficult to actuate, usually requiring the use of a tool such as a wrench or screwdriver.

One object of the invention is to provide a swivel chair support construction of the type described embodying a self-locking feature which automatically locks the chair seat at the desired height, while at the same time permitting the height of the chair to be readily adjusted by rotation of the bell when the chair is empty.

Another object of the invention is to provide a connecting means which permits the entire chair to be lifted and moved from place to place without change of the height adjustment or separation of leg assembly from the chair seat simply by grasping the chair seat, which is readily releasable without the use of tools, and which prevents significant axial movement of the nut along the spindle when the chair seat is rotated.

Other objects and advantages will become apparent from the following description of a preferred embodiment of the invention, taken together with the attached drawings thereof, in which:

FIG. 1 is a view in side elevation, partly broken away and in cross-section, of a swivel chair support construction in accordance with the invention;

FIG. 2 is a view in section taken along line 2—2 of FIG. 1 of the connecting means and spindle of the construction;

FIG. 3 is a view of the connecting means or hook in cross-section taken along line 3—3 of FIG. 2;

FIG. 4 is an exploded perspective view of a portion of the construction shown in FIG. 1;

FIG. 5 is a view in side elevation partly broken away, of a portion of the support construction of FIG. 1 as the spindle is inserted into or removed from the tubular member of the leg assembly;

FIG. 6 is a view similar to that of FIG. 5, showing actuation of the connecting means to permit engagement or disengagement; and

FIG. 7 is a view similar to that of FIGS. 5 and 6 showing the connecting means in engaged position to prevent separation of the spindle from the tubular member of the leg assembly.

Referring to FIG. 1, the construction has a threaded spindle **10** having a smooth cylindrical bearing surface **12**. The upper end of spindle **10** is secured in any suitable manner, preferably by non-detachable staking, to a conventional fitting **14** which is arranged to be secured to the bottom of a chair seat and which may provide for tilting of the chair seat if desired. Leg assembly **16** is provided with a bearing for supporting the spindle. The bearing includes a washer **18** rigidly fastened to and seated on top of leg assembly **16** and a flanged steel support collar **20** which is rigidly fastened to washer **18** and held in place by a swaged steel tube **22**. Mounted within tube **22** is a bearing liner **24** of synthetic plastic compositions supported on collar **20** by means of radially extending flange **26** which is formed integrally with liner **24** and which serves as a load bearing element. The outer periphery of flange **26** is located at a distance R_1 (FIG. 1) from the axis **28** of rotation of spindle **10**. While a variety of materials such as synthetic plastic compositions are suitable for use in making the bearing liner, as is well known, the material preferred for best results is a superpolyamide. While the length of lower unthreaded portion **12** of spindle **10** is not critical, it is preferred that it be at least half the length of bearing liner **24**.

A load supporting nut **30** is engaged with the threads on spindle **10** and has an annular recess **32** near the top thereof.

Bell **34** may be of any conventional size or shape to match the leg assembly **16** and has a center opening in the top thereof arranged to be swedged in place in recess **32** around nut **30** in fixed engagement therewith.

Connecting means in the form of an embossed hook **36** is arranged to be mounted around spindle **10** between nut **30** and flange **26** and has substantially flat arcuate portion **38** resting on flange **26** and an arm **40** which extends radially outwardly from portion **38** beyond the outer periphery of flange **26** and then downwardly and radially inwardly below collar **20** and defines an annulus about a portion of the outer periphery of flange **26** and collar **20**.

Referring to FIGS. 2 and 3, hook **36** has a key **50**, opposite hook arm **40** extending radially inward from portion **38**, with flared end portion **52**, and arranged to be engaged in a cooperating and vertically extending keyway **54** and terminating below the threads on spindle **10** cut in spindle **10** at concave bottom end portion **55**, and has four detents **56** pressed in portion **38**, spaced 90° apart and extending 0.03" above the otherwise flat surface **58** of portion **38**. Detents **56** are arranged to seat in recesses **60** in the bottom **62** of nut **30** to restrain rotation of the nut **30** on spindle **10**. The distance from the central axis **66** of opening **68** (FIG. 3) in portion **38** to inner surface **64** of arm **40** varies from R_2, which is less than R_1, at the bottom or free edge **70** of arm **40**, to R_3, which is greater than R_1, near the point **72** at which arm **40** begins to extend downwardly. Opening **68** through hook **36** has a radius R_4 greater than the outer thread radius R_5 (FIG. 1) of spindle **10**, but less than R_1, to permit portion **38** to be tilted from a horizontal plane (FIGS. 6 through 8).

Chair seat with attached spindle **10** is assembled with leg assembly **16** in the following fashion:

Hook **36** is mounted on spindle **10** beneath nut **30** with key **50** aligned with keyway **54**. Spindle **10** is then inserted in tubular member **22** of leg assembly **16** until the free end **70** of arm **40** rests on flange **26** with portion **38** either in a horizontal plane or rotated clockwise from the horizontal (as shown in FIG. 5). Hook **36** is then tilted to raise arm **40** automatically by the urging of flange **26** against edge **70** as spindle **10** is inserted further into tubular member **24** until free end **70** of arm **40** projects radially beyond flange **26**. As shown in FIG. 6, the tilting of hook **36** may also be performed manually, if desired. Spindle **10** is then fully inserted into member **24** until nut **30** rests on hook **36**. Arm **40** first passes around flange **26** and collar **20** and as the apparatus approaches the position shown in FIG. 1, flange **26** and bottom **62** of nut **30** cooperate to align hook **36** with portion **38** in a horizontal plane and with arm **40** projecting around and below collar **20** and flange **26** as shown in FIG. 1. Bell **34** together with nut **30**, are then rotated until the seat is at the desired height, the detents **56** simply riding into and out of engagement with recesses **60** during this operation. Bell **34** shrouds hook **36** and the outer surface thereof presents a smooth appearance to the eye.

The detents **56** on hook **36** and indents in bottom **62** of nut **30** cooperate to prevent, absent adjustment, seat height from changing over an extended period of use of the chair since they, together with key **50**, tend to prevent rotation of the nut **30** with respect to spindle **10** and cause relative rotation to occur between the bottom of hook **36** and the flange **26** of bearing liner **24** when the chair seat is rotated on the leg assembly.

After the chair has been assembled, hook **36** prevents spindle **10** from being removed or axially separated accidentally, for example, as a result of lifting the chair by its seat, from tubular member **22**.

If chair seat with attached spindle **10** is lifted relative to tubular member **22**, key **50** is lifted at flared end **52** by keyway **54**, tilting the hook **36** so that arm **40** engages a portion of collar **20**, as shown in FIG. 7, and the opposite edge portion of hook **36** engages between threads of the spindle. In this cocked position hook **36** prevents separation of spindle **10** from the leg assembly.

If key **50** slips in keyway **54** and hook **36** is not tilted sufficiently to become cocked against spindle **10**, flared end **52** comes into contact with bottom end **55** of keyway **54** and hook **36** and arm **40** are urged thereby in a direction perpendicular to axis **28** toward keyway **54**. Portion **38** becomes wedged on top of collar **20** with inner surface **64** of arm **40** pulled against flange **26** and tilting of edge **70** of arm **40** about flange **26** is prevented until the chair is lowered.

However, removal of spindle **10** from tubular member **22**, for example in order to assemble the chair with a new leg assembly, is quickly and simply accomplished. Hook **36** is pushed, in the direction of arm **40**, against spindle **10**, hook **36** and arm **40** are tilted to the position shown in FIG. 6 with arm **40** clear of collar **20** and flange **26**, and spindle **10** is withdrawn from tubular member **22**. This operation is performed most easily by placing the chair on its side and backing off bell **34** and nut **30** to expose the hook **36**.

Thus, the invention prevents accidental removal of the seat from the leg assembly or accidental change of the height adjustment and permits extremely fast assembly and disassembly, without the use of tools, of different seats and leg assemblies. Furthermore, it permits the use of a bell with a smooth surface, rather than a bell having a set screw therein and, therefore, improves the overall appearance of the chair, while eliminating the risk of personal injury or of marring of the surface of the bell caused by slipping of a screwdriver used to adjust the set screw.

What is claimed is:

1. A swivel chair support construction comprising

a spindle having one end adapted to be attached to a chair seat, a portion of said spindle being threaded for a sufficient distance to provide vertical adjustability of position of the chair to the desired extent,

a tubular member receiving said spindle in loose sliding engagement, said tubular member being adapted to be secured to a chair base and including a load bearing element and a flange,

a load supporting nut threadedly engaged on said spindle,

means for releasably connecting together said spindle and tubular member to prevent axial separation thereof when the chair is lifted, said means comprising a hook having an arcuate portion extending around at least a major portion of the periphery of said spindle adjacent the tubular member and being a loose fit on the spindle and freely slidable along the axis of the spindle independently of the nut when the arcuate portion lies in a plane perpendicular to said axis but binding upon the spindle when the hook is cocked on the spindle,

and an arm fixed to and extending from said hook toward the tubular member and terminating in a free end, said arm being free from engagement with the tubular member when the hook is cocked in one direction on the spindle to displace the free end of the arm away from the spindle, and being arranged to engage a flange of the tubular member to prevent separation of the hook from the tubular member when the hook is cocked in the opposite direction on the spindle.

2. The swivel chair support construction as claimed in claim **1** wherein said spindle has an unthreaded portion and said tubular member has an end adapted to receive said unthreaded portion in loose sliding engagement and a bearing is disposed at said end, said hook being disposed between said load supporting nut and said bearing.

3. The swivel chair support construction as claimed in claim **1** wherein said arcuate portion of said hook de-

fines an annulus, said annulus being disposed around the periphery of said spindle.

4. A swivel chair support construction as claimed in claim 1 wherein said nut carries a bell shrouding said hook and said bearing.

5. The swivel chair support construction as claimed in claim 1 wherein one of said hook and said nut has a detent and the other of said hook and said nut has an indent said detent being arranged to mate with said indent when said spindle and said key rotate relative to said nut in the manner that said nut is prevented from rotating further relative to said spindle.

6. The swivel chair support construction as claimed in claim 1 wherein said spindle has a keyway disposed parallel to said axis of said spindle and said hook has a key, said key being arranged to be engaged in said keyway for rotation of said hook about said axis of said spindle when said spindle rotates about said axis.

7. A swivel chair support construction as claimed in

claim 6 wherein said keyway terminates in a bottom end portion along said spindle and said key is disposed remote from said arm on said arcuate portion,

said key and said bottom end portion being arranged to cooperate to urge said arm to engage said tubular member when said chair is lifted and said hook is other than cocked on said spindle.

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WILLIAM H. SCHULTZ, Primary Examiner

U.S. Cl. X.R.

248—188.7