

Feb. 5, 1929.

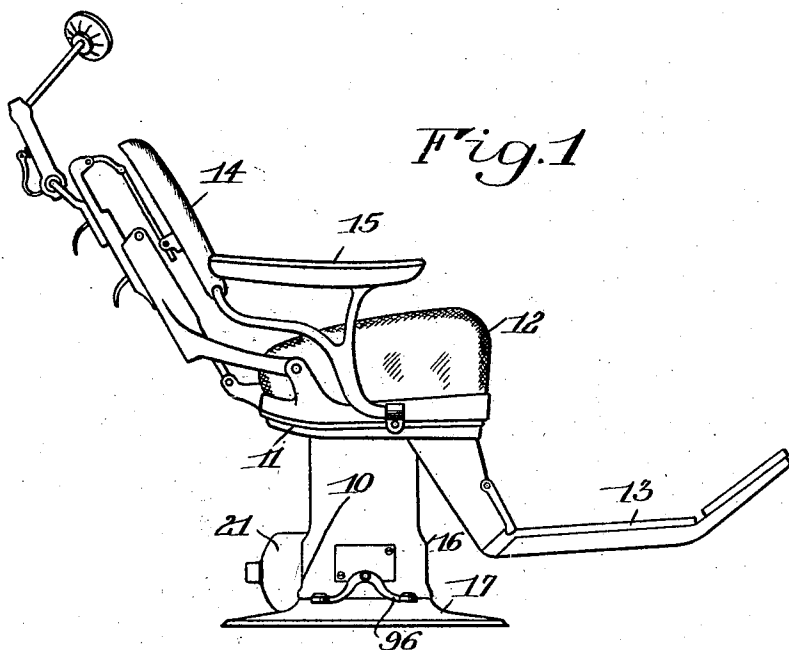
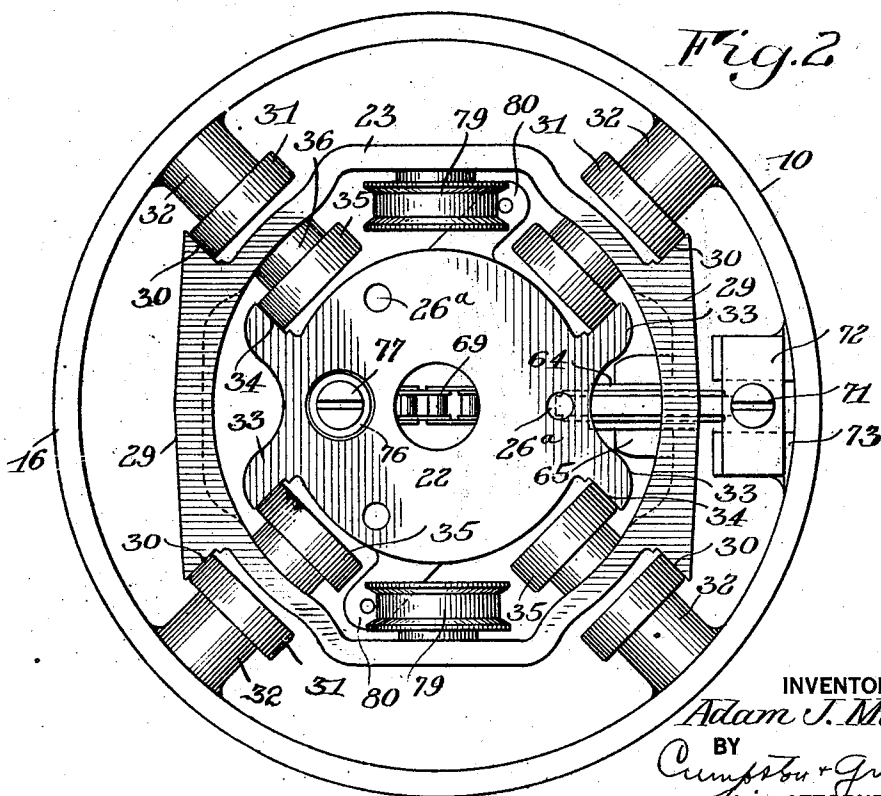
1,700,741

A. J. MAY

EXTENSIBLE CHAIR

Filed May 17, 1926

7 Sheets-Sheet 1



INVENTOR
Adam J. May
BY
Cumpton & Griffith
ATTORNEYS

Feb. 5, 1929.

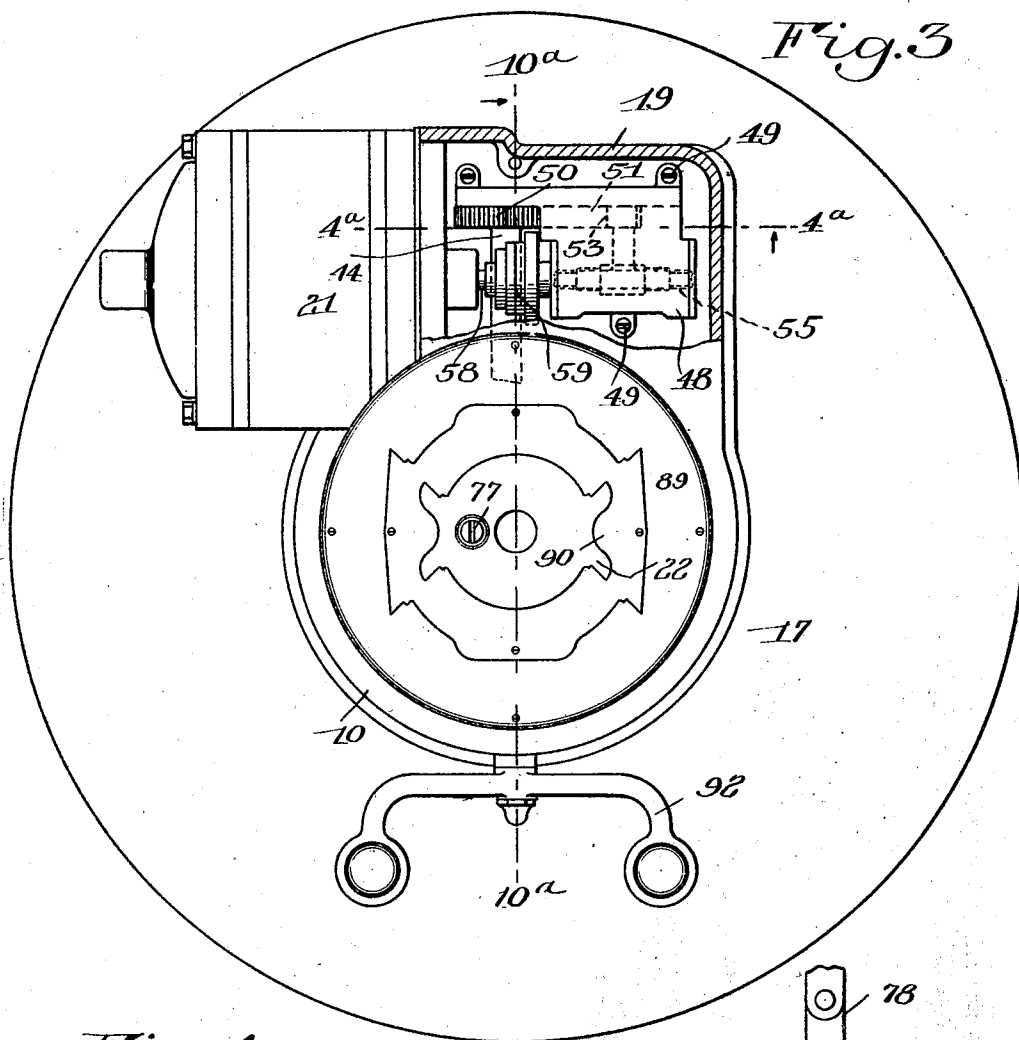
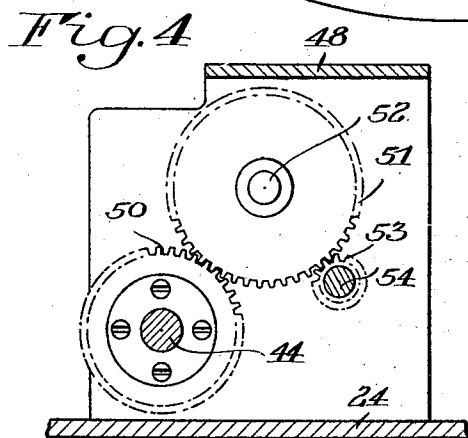
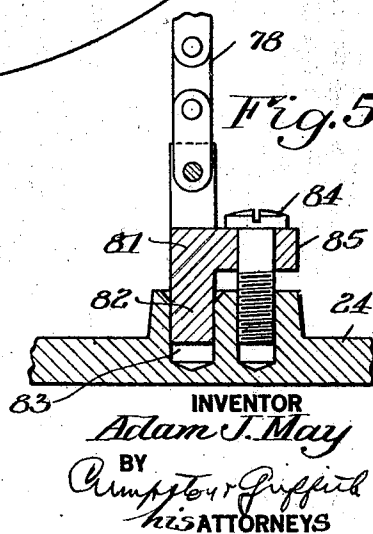
1,700,741

A. J. MAY

EXTENSIBLE CHAIR

Filed May 17, 1926

7 Sheets-Sheet 2



Feb. 5, 1929.

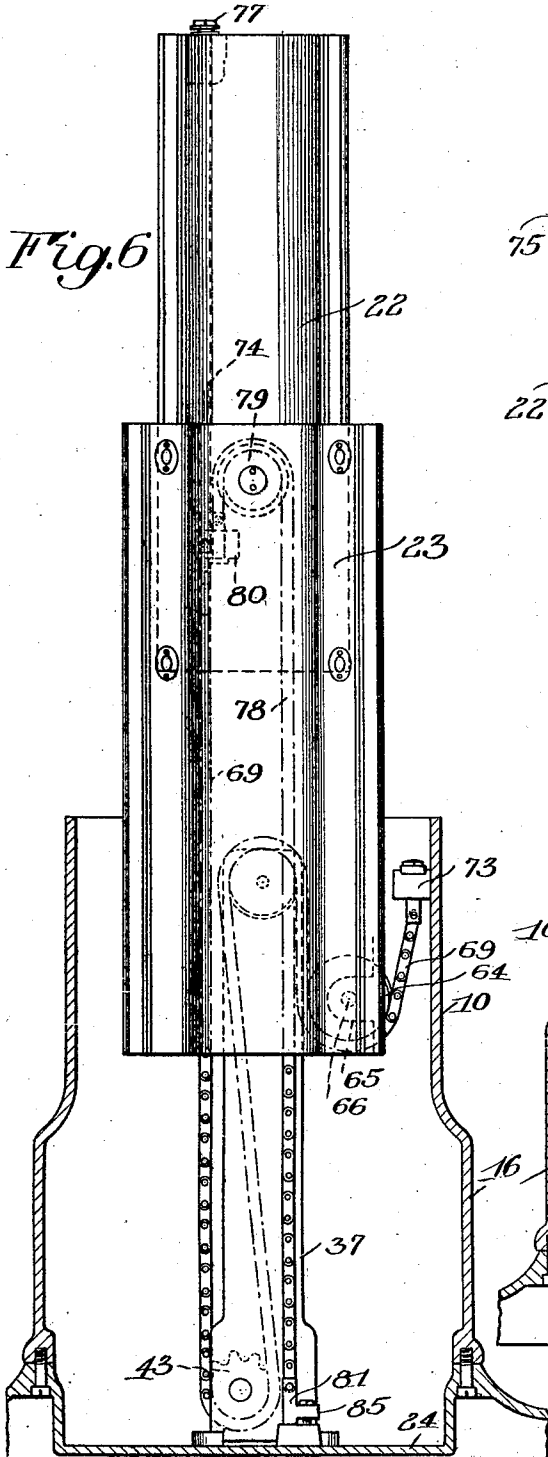
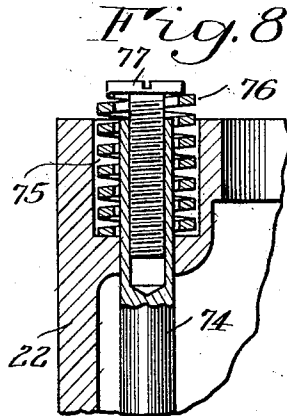
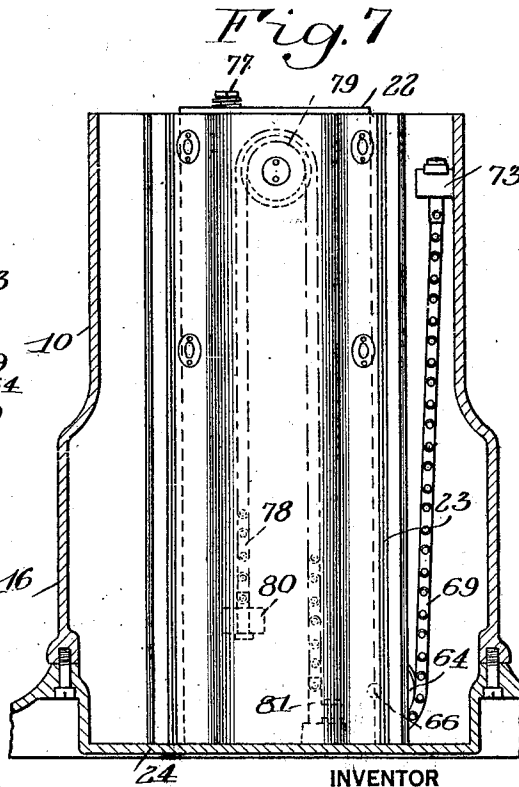
1,700,741

A. J. MAY

EXTENSIBLE CHAIR

Filed May 17, 1926

7 Sheets-Sheet 3



INVENTOR
Adam J. May
BY
Orinpton & Griffith
his ATTORNEYS

Feb. 5, 1929.

1,700,741

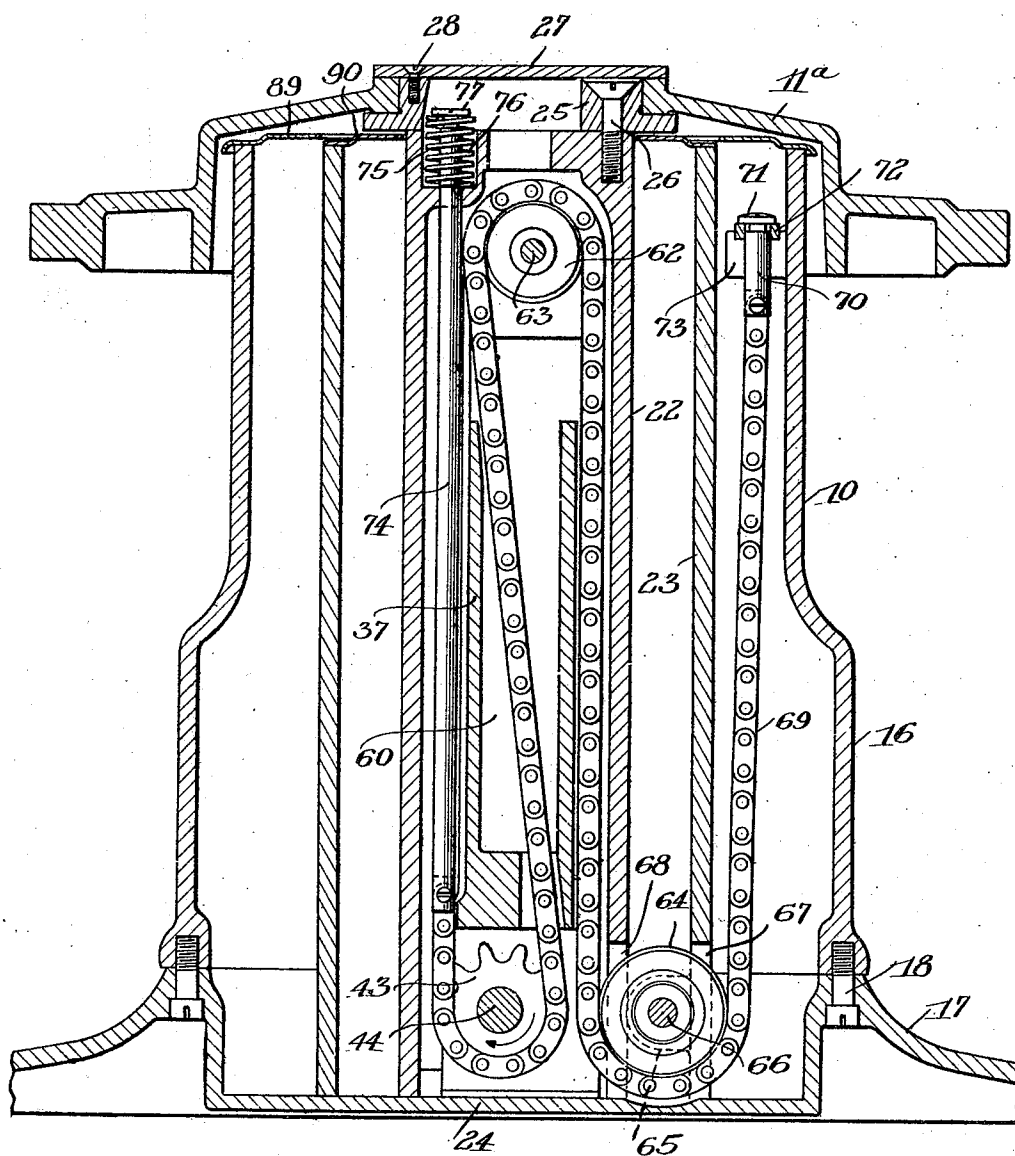
A. J. MAY

EXTENSIBLE CHAIR

Filed May 17. 1926

7 Sheets-Sheet 4

Fig. 9

**INVENTOR**

INVENTOR
Adam J. May

BY

BY
Crumpton & Griffith
his ATTORNEYS

his ATTORNEYS

Feb. 5, 1929.

1,700,741

A. J. MAY

EXTENSIBLE CHAIR

Filed May 17, 1926

7 Sheets-Sheet 5

Fig. 12

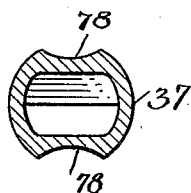


Fig. 11

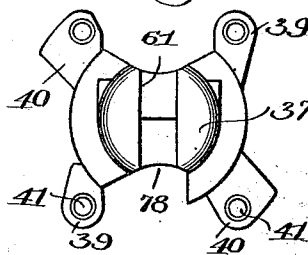
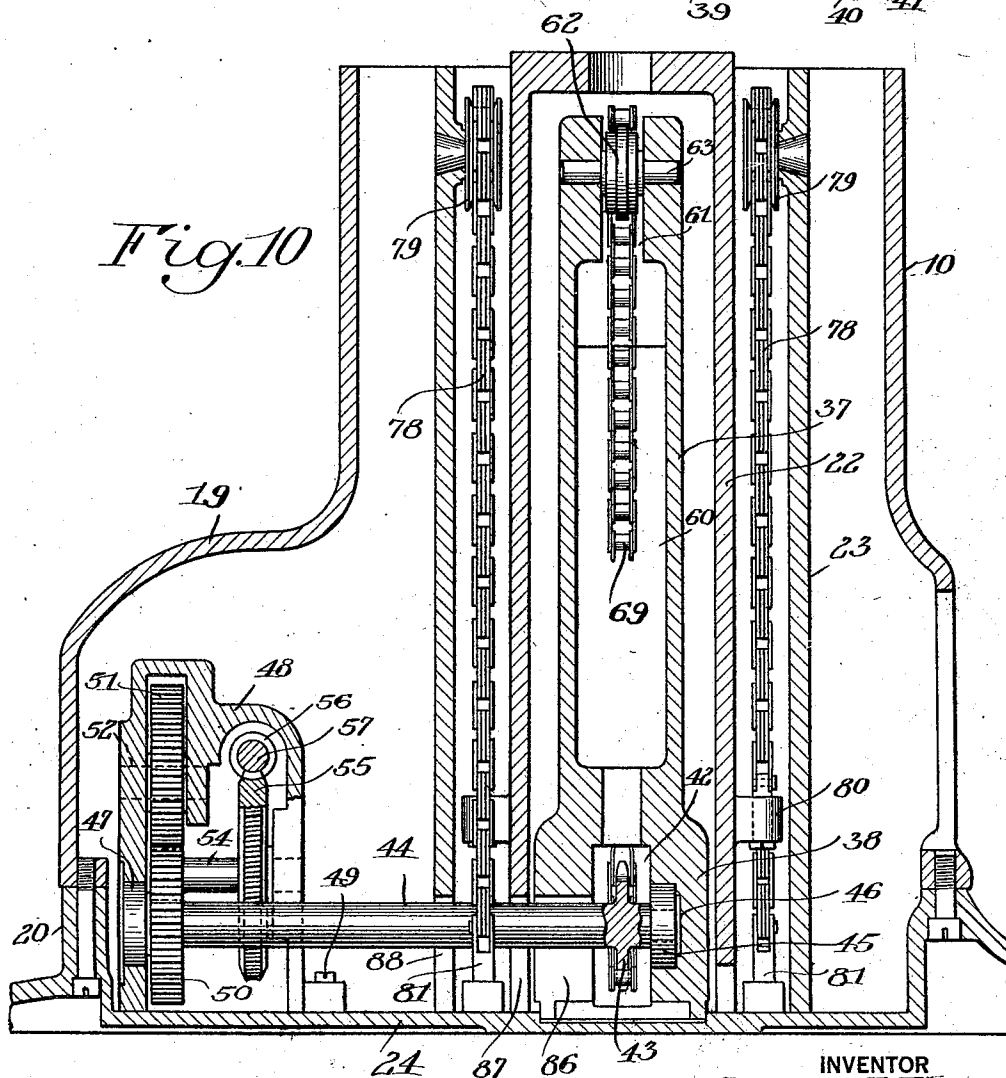


Fig. 10



INVENTOR

Adam J. May

BY

Quimpton & Griffith
his ATTORNEYS

Feb. 5, 1929.

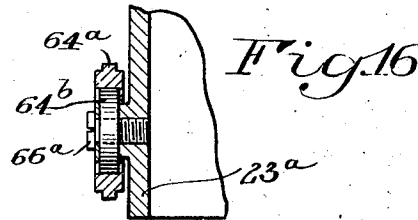
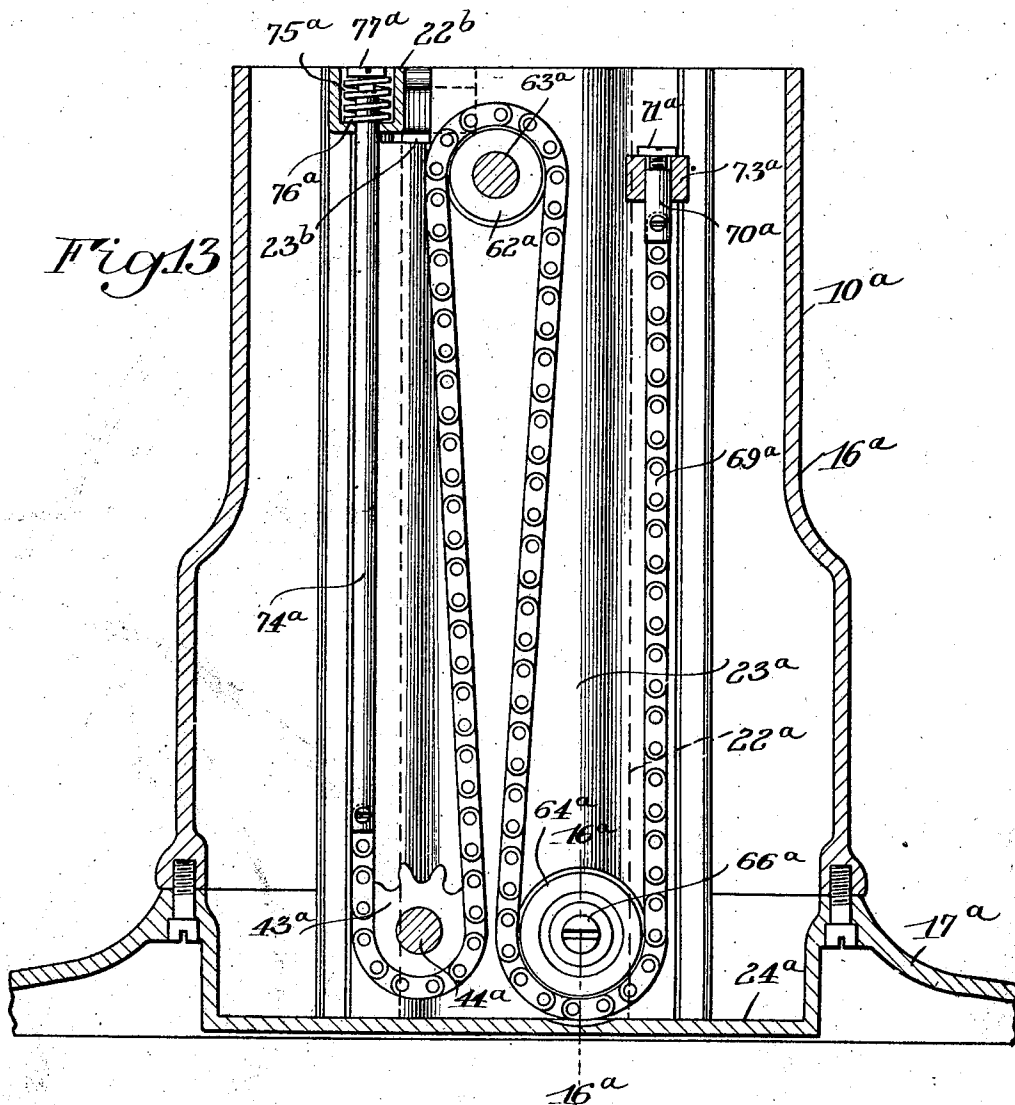
1,700,741

A. J. MAY

EXTENSIBLE CHAIR

Filed May 17, 1926

7 Sheets-Sheet 6



INVENTOR
Adam J. May
BY
Cumpton & Griffith
his ATTORNEYS

Feb. 5, 1929.

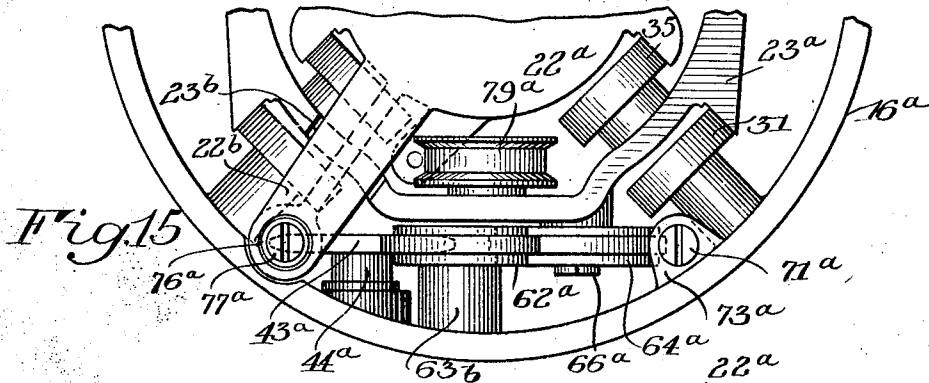
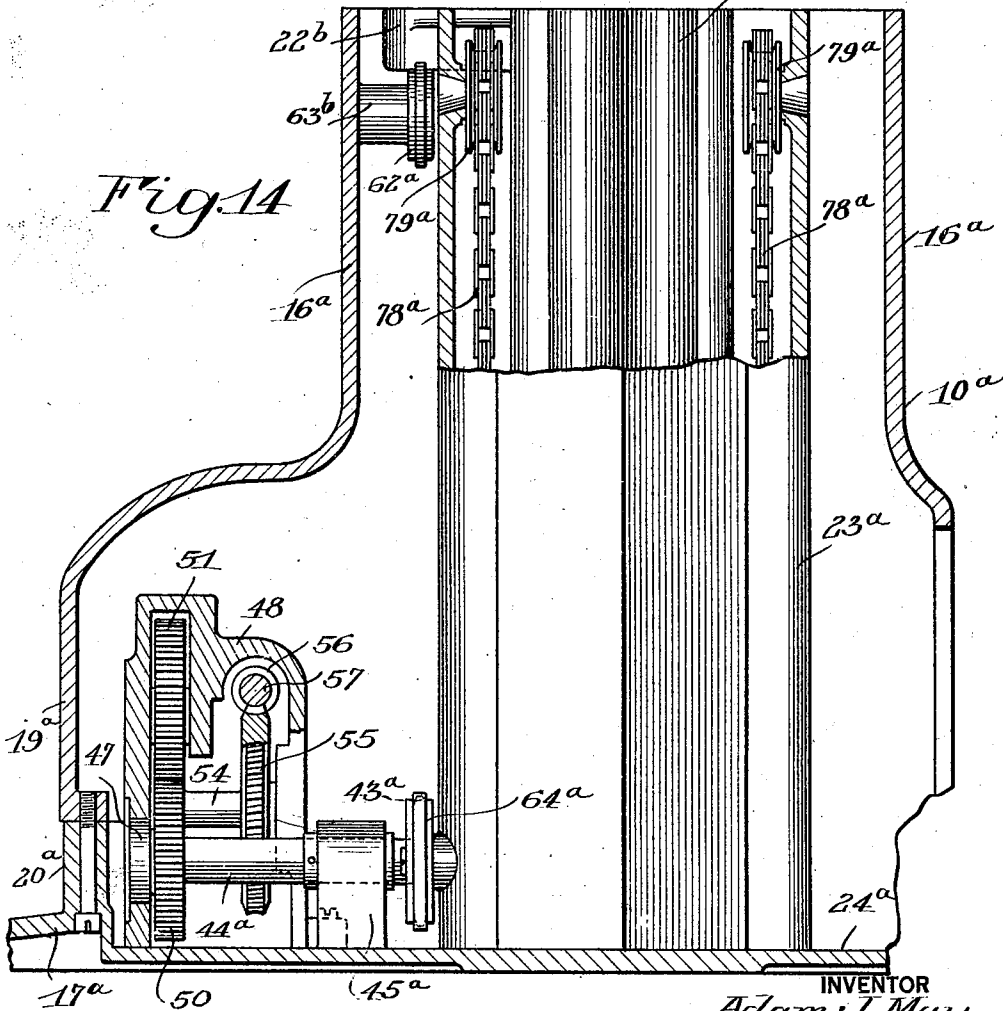
1,700,741

A. J. MAY

EXTENSIBLE CHAIR

Filed May 17, 1926

7 Sheets-Sheet 7



INVENTOR
Adam J. May
BY
Cumtost & Guggenb
HIS ATTORNEYS

UNITED STATES PATENT OFFICE.

ADAM J. MAY, OF ROCHESTER, NEW YORK, ASSIGNOR, BY MESNE ASSIGNMENTS, TO
BITTER DENTAL MANUFACTURING COMPANY, INC., OF ROCHESTER, NEW YORK, A
CORPORATION OF DELAWARE.

EXTENSIBLE CHAIR.

Application filed May 17, 1926. Serial No. 109,560.

The present invention relates to extensible chairs and has for its object to provide an improved raising and lowering mechanism applicable to dental, surgical, and other types
5 of chairs and which is efficient in operation and economical to manufacture.

A further object of the invention is to provide an improved lifting mechanism for extensible chair sections embodying a flexible power driven connection, through the
10 medium of which one section is adapted to raise another.

A further object of the invention is to provide an extensible chair including telescoping columns or sections with improved means for elevating and lowering the sections whereby they are moved simultaneously one
15 relative to another in either direction.

A still further object of the invention is to provide an extensible chair having telescoping sections guided within a base or casing wherein one section is adapted to lift the other, the lifting section being elevated and lowered by means of a flexible connection yieldably supported at one end whereby
20 it is held taut and maintained in proper relation with a power driven element operating in engagement therewith.

To these and other ends the invention resides in certain improvements and combination of parts all as will be hereinafter more fully described, the novel features being pointed out in the claims at the end of the specification.

35 In the drawings:

Fig. 1 is a side elevation of a chair embodying the invention;

Fig. 2 is a top plan view of the chair base showing the relative positions of the telescoping sections and the manner of guiding the same;

Fig. 3 is a top plan of the base shown partly in section to illustrate the motor drive mechanism for raising and lowering the telescoping sections;

Fig. 4 is a vertical section taken on line 4^a—4^a of Fig. 3, showing a portion of the driving mechanism for raising the chair sections;

50 Fig. 5 is a fragmentary sectional elevation showing an adjustable connection for the lower end of one of the chains interposed between the telescoping sections;

Fig. 6 is a part sectional elevation showing the telescoping sections in raised position; 55

Fig. 7 is a similar view with the sections in lowered position;

Fig. 8 is an enlarged detail vertical section showing a yieldable anchor for one end of the flexible operating connection by which
60 the sections are elevated.

Fig. 9 is a central vertical section showing the chair sections in lowered position and illustrating a portion of the lifting mechanism for the sections; 65

Fig. 10 is a vertical section taken substantially on line 10^a—10^a of Fig. 3;

Fig. 11 is a top plan of a fixed standard projecting within the telescoping sections as shown in Fig. 10; 70

Fig. 12 is a horizontal section of the standard;

Fig. 13 is a vertical section corresponding to Fig. 10 and showing a modified form of the invention; 75

Fig. 14 is a diagrammatic view in elevation and partly in section showing the modified chain and pulley arrangement for lifting the extensible chair raising columns;

Fig. 15 is a top plan view showing the relative positions of the pulleys and connections for the sprocket chain by which the outer column is raised; and 80

Fig. 16 is a fragmentary vertical section on line 16^a—16^a of Figure 13 showing the manner of attaching the lower pulley to the outer column. 85

Similar reference numerals throughout the several views indicate the same parts.

The embodiment of the invention disclosed herein by way of illustration of the principles involved comprises preferably a base indicated generally at 10 and a chair seat frame 11 upon which is supported a seat or cushion 12, a foot rest 13, a back 14, side arms 15 and other parts as shown in Fig. 1, all of which may be of any approved or well known construction. The base, which may be of any desired shape, preferably comprises an upper cylindrical section or casting 16 and a lower flanged section 17 connected preferably as indicated in Figs. 9 and 10 by the stud bolts 18. 100

The upper and lower casing sections are provided respectively with extended portions 19 and 20 at one side of the base to form a 105

housing for the driving mechanism by which the chair sections are elevated, this being preferably done through the medium of a reversible electric motor 21 secured to the extensions at one side thereof as shown in Fig. 3.

Disposed within the base 10 are the inner and outer chair raising columns or sections 22 and 23 respectively which are adapted to rest upon the bottom 24 of the base section 17 when the columns are in their lowermost position as shown in Fig. 10. The seat frame 11^a for supporting the frame 11 is carried by the inner section 22 being connected therewith by a flanged ring 26 secured preferably by a suitable number of screws 26, one of which is shown in Fig. 9, the screws being threaded into openings 26^a which are indicated in Fig. 2. The seat frame is held upon the ring 25 by a plate 27 forming a closure for the upper end of the section 22 and being secured to the ring by a suitable number of screws 28.

The shape of the extensible sections 22 and 23 is best indicated in Fig. 2, the outer section having oppositely disposed side portions 29 each of which is provided with a pair of vertically extending angularly disposed tracks 30 upon which travel the guide rollers 31 which are suitably journaled in bearings 32 projecting inwardly from the base 10. Any number of the rollers may be provided, preferably one pair for each track, only one of which is shown. The inner section 22 is guided by the outer section, the former having laterally projecting and vertically arranged extensions 33 each having a track 34 upon which a suitable number of rollers 35 are adapted to travel, said rollers being journaled in bearings 36 on the inner face of the outer section 23 as shown in Fig. 2.

Projecting upwardly within the section 22 is a standard 37 provided with an enlarged base portion 38 having two sets of projecting lugs 39 and 40 each of which is adapted to rest upon the bottom 24 of the base and to be secured thereto by screws or bolts, not shown, arranged to extend through openings 41 in the lugs. The base portion 38 of the standard 37 is provided with a vertically disposed recess 42 for the reception of a sprocket 43 on a drive shaft 44 having its inner end journaled in a bearing 45 secured in a pocket or recess 46 of the standard 37 as shown in Fig. 10. The outer end of the shaft 44 is journaled in a bearing 47, seated in a frame or gear casing 48 as best shown in Figs. 3 and 10, the frame being carried by the bottom 24 of the base to which it is secured by screws 49. The shaft 44 has a gear 50 suitably secured thereon which is in mesh with a gear 51 free to rotate upon an arbor 52 supported by the frame 48 as shown in Fig. 10. The gear 51 is driven by a pinion 53 on a short shaft 54 suitably journaled in the frame 48

and carrying a worm wheel 55. A worm 56 upon a shaft 57 serves to drive the worm wheel. The worm shaft is suitably journaled in a pair of bearings supported by the frame 48 and is connected with the armature shaft 58 of the motor 21 by a suitable coupling 59, preferably one of the flexible type.

The standard 37 is of the hollow type as indicated at 60 in Figs. 10 and 12, and is provided at its upper end with a relatively narrow right angular recess 61 in which is positioned a pulley 62 rotatably disposed upon a pin 63 having its opposite ends supported by the standard as shown in Fig. 10. A second pulley 64 is rotatably mounted between a pair of lugs 65 projecting inwardly from the lower end of the outer column 23, said pulley being carried by a pin 66 having its opposite ends supported by said lugs. The pulley 64 projects through a slot 67 in the outer column and also into a slot 68 in the bottom of the inner column when the latter is in lowered position as shown in Fig. 9.

The lifting element for the outer column comprises a flexible connection 69, preferably in the form of a chain and having at its outer end an adjustable bolt comprising a cylindrical nut 70 into which is threaded a screw 71 projecting through and having its head resting upon a bar 72 supported by lugs 73 extending inwardly from the casing 16 as shown in Figs. 2 and 9. The connection 69 extends downwardly around the pulley 64, thence upwardly within the inner column 22 and over the pulley 62 and then down through the standard 37 around the sprocket 43 and upwardly a short distance where it connects with a rod 74. The rod extends vertically within the column 12 and projects into a pocket 75 formed in the upper end of said column as shown in Fig. 9. A spring 76 surrounds the rod within the pocket, the tension of the spring being regulated by a screw 77 threaded into the rod as shown in Fig. 8. The spring serves to hold the chain taut under all conditions of operation and maintains the rollers of the chain in proper engagement with the teeth of the sprocket, both during the ascending and descending movements of the sections.

The use of the spring or a yieldable anchor for the chain is an important feature of the lifting mechanism and is essential to the successful operation of said mechanism, particularly on the downward stroke of the sections for the reason that the slack in the chain during this time would ordinarily be sufficient to permit the rollers to drop or ride outwardly on the teeth of the sprocket to the extremities thereof, or to a point at which a binding action might take place between the teeth and the rollers which might result in bending or breaking the teeth of the sprocket or in the rupture of the chain. This difficulty is avoided by employing the yield-

able means shown for keeping the chain taut during the descent of the inner and outer chair raising columns.

The standard 37 is grooved at its opposite sides as indicated at 78' in Fig. 12 to receive the chain 69 and rod 74 which move within the grooves when the sections are raised and lowered.

It will be understood from the construction described above that the motor serves to drive the sprocket 43 and that rotation of the latter in the direction indicated by the arrow in Fig. 9 will exert a pull on the chain which will elevate the outer column or section 23.

Raising of the inner column is effected at the same time by movement of the outer column, through the use of a pair of flexible connections or chains 78, each extending over a pulley 79 rotatably mounted upon the inner face of the outer column 23 as shown in Fig. 10. One end of each chain 78 is connected to a lug 80 projecting from the inner column near the bottom thereof, the opposite end of the chain being connected with an adjustable anchor 81 having a depending portion 82 guided in a recess 83 formed in the bottom 24 of the base as shown in Fig. 5. The anchor may be adjusted vertically from time to time by a screw 84 to take up slack in the chain, the screw being extended through a laterally projecting portion 85 of the anchor and threaded into the bottom 24 of the base as shown.

It will be apparent from the construction just described that raising of the outer section through the medium of the sprocket 43 and chain 69 will effect simultaneous raising of the inner section 22, since the chain 78, extending over the pulley 79 of the outer section, has one end fixed to the bottom of the base and the other to the bottom of the inner section 22. Furthermore it will be apparent that the inner section will move twice as fast as the outer section since the movement of the chain is twice that of the movement of the outer section.

In the downward movement of the sections the motor is of course reversed, so that the pull of the sprocket is transferred to the inner section 22 through the rod 74 and spring 76, the outer section being lowered at the same time by the return movement of the chain 69 traveling over the pulley 62 as will be understood.

The standard 37, the inner section 22 and outer section 23 are each slotted as indicated at 86, 87, and 88 respectively to afford clearance for the sprocket shaft 44 as shown in Fig. 10.

The casing 16 is provided at its upper end with a cover 89 having an opening through which the chair raising sections operate and the outer section is provided with a cover 90 through which the inner section 22 projects as shown in Fig. 9.

The electric switch for controlling the operation of the motor, not shown, is preferably controlled by a foot pedal 92 located at one side of the chair base as shown in Fig. 3.

In the modification shown in Figures 13 to 16 inclusive, the base 10^a is similar to the base shown in Figures 1 to 3 and 9 and 10 with but slight differences, as will appear hereinafter. The base 10^a comprises the upper and lower sections 16^a and 17^a, respectively, the latter having a bottom 24^a upon which normally rests the inner and outer extensible chair raising sections 22^a and 23^a, as shown in Figure 13. The casing sections 16^a and 17^a are provided with extended portions 19^a and 20^a to which the reversible motor for raising the chair sections is secured, as shown in Figure 3. The gear arrangement driven by the motor 21 for raising the sections is shown in Figure 14 is the same as that shown in Figure 10, being given the same reference characters. The sprocket shaft 44^a which is driven by the gear 50 is suitably journaled in bearings 47 and 45^a, the latter extending upwardly from the bottom 24^a of the base, as shown in Figure 14. A sprocket 43^a is fixed on the inner end of the shaft and is operatively associated with the chain or flexible connection 69^a as shown in Figure 13. The chain is secured at one end to an adjustable connection comprising a cylindrical nut 70^a and a screw 71^a threaded into the nut. The connection extends through and is supported by a lug 73^a projecting inwardly from the casing 16^a as shown in Figure 15. The chain extends downwardly from said lug around a pulley 64^a on the bottom of the outer chair raising section 23^a and is carried upwardly over a pulley 62^a having a spindle 63^a journaled in a bearing 63^b projecting inwardly from the casing 16^a as shown in Figure 15. The chain is carried downwardly from the pulley 62^a around the sprocket 43^a and thence upwardly a short distance where it connects with a rod 74^a.

The upper end of the rod projects into a recess or pocket 75^a formed in the outer end of an arm or bracket 22^b extending laterally from the top of the inner chair raising section 22^a. The outer section 23^a is cut away at 23^b to afford clearance for the arm, as shown in Figures 13 and 15. The arm may be cast integral with the inner chair raising section or otherwise secured thereto as desired.

The rod 74^a is connected at its upper end with a spring 76^a which surrounds the rod within the recess 75^a of the arm, the tension of the spring being regulated by a screw 77^a threaded into the rod and engaging the upper end of the spring. The spring serves to hold the chain taut under all conditions of operation, being provided for the same purpose and functioning in the same manner as the spring 76 shown in Figure 9.

The pulley 64^a on the lower end of the outer chair raising section 23^a is preferably carried

by a bearing 64^b rotatably disposed on a pivot pin 66^a which is preferably connected with the outer section as shown in Figure 16.

The chains 78^a by which the outer chair raising section is made to raise the inner section have their ends secured to the inner section and to the base in the same manner as the chains 78 shown in Figure 10, said chains being extended over pulleys 79^a journaled on the inner face of the outer column 23^a as shown in Figure 14.

The outer and inner sections are guided by the rollers 31 and 35 in the same manner as shown in Figure 2.

The operation of the modified arrangement is the same as that embodied in Figures 1 to 12 inclusive, the same motor and driving mechanism being employed in both cases, the principal difference being in omitting the central standard 37 as a support for the intermediate chain carrying pulley 62, this pulley in the modified arrangement being secured to the top of the casing 16^a so that the chain 69^a may operate entirely between the outer chair raising section and the casing surrounding the same.

I claim as my invention:

1. In an extensible chair, a base, a column disposed therein, a second column within the base, means operatively connecting the first mentioned column with the second to effect raising of the latter, a flexible connection interposed between the second mentioned column and the base and operatively connected with the first mentioned column to effect raising of the same and means operatively engaging said connection.

2. In an extensible chair, a base, inner and outer extensible columns adapted to be guided within the base, a flexible connection interposed between said base and one of said columns and operatively connected with the other column to effect raising of the first mentioned column, means connecting the last mentioned column with the base to raise said last mentioned column and means operatively engaging said connection.

3. In an extensible chair, a base, inner and outer extensible columns adapted to be guided in the base, a flexible connection having one end anchored upon the base and the other upon one of said columns, a rotatable member upon the other of said columns on which said connection is adapted to travel, means actuated by the last mentioned column for lifting the other column and a driven member operatively engaging said flexible connection.

4. In an extensible chair, a base, inner and outer chair raising sections guided within the base, a flexible connection operatively associated with the outer section and having one end anchored upon the base and the other connected with the inner section, a re-

volvable support upon which the connection is adapted to travel, actuating means for said connection and means for moving the inner section relative to the outer section.

5. In an extensible chair, a base, inner and outer chair raising sections guided within the base, a pulley journaled upon the outer section, a second pulley supported within the base, a flexible connection engaging said pulleys and having one end connected with the inner section and the other connected with the base, a revolvable member operatively engaging said connection for actuating the same, means for driving said revolvable member and means adapted to be operated by the outer section to effect raising of the inner section.

6. In an extensible chair, a base, inner and outer chair raising sections guided within the base, a chain operatively associated with the outer section and having one end anchored upon the base and the other upon the inner section, actuating means for said chain including a sprocket and means actuated by the outer section adapted to raise the inner section.

7. In an extensible chair, a base, inner and outer chair raising sections guided within the base, a flexible operating connection having one end anchored upon the base and the other upon the inner section and being connected intermediate its ends with the outer section, a pulley connected with the base and forming a support upon which said operating connection is adapted to travel, actuating means for said connection and flexible devices actuated by the outer section adapted to move the inner section relative thereto.

8. In an extensible chair, a base, inner and outer chair raising sections located within the base, a flexible operating connection having one end anchored upon the base and the other upon the inner section, a revolvable support carried by the base upon which the flexible operating member is adapted to travel, means connecting said flexible connection with the outer section to effect raising of the latter, means for actuating said connection and means located between the inner and outer sections adapted to be actuated by the latter to raise the former.

9. In an extensible chair, a base, inner and outer chair raising sections supported by the base, a pulley journaled upon the outer section, a support projecting within the inner section, a pulley mounted on said support, a flexible operating member engaging said pulleys and having one end anchored upon the base and the other upon the inner section, means for actuating said flexible member to elevate said outer section and means actuated by the outer section adapted to raise the inner section.

10. In an extensible chair, a base, a column disposed therein, a second column within the base, means operatively connecting the first column with the second to effect lifting of the latter, a chain operatively associated with the first mentioned column and having one end yieldably connected with the second mentioned column and the other connected with the base and actuating means for the chain including a sprocket.

11. In an extensible chair, a base, a column disposed therein, a second column within the base, means operatively connecting the first column with the second to effect lifting of the latter, a flexible connection operatively associated with the first column and having one end anchored upon the base and the other yieldably connected with the second column, a power shaft, and a member driven thereby adapted to actuate said connection to effect raising of said first column.

12. In an extensible chair, a base, a chair raising column disposed therein, a support within the base, a flexible connection operatively associated with said column and having one end secured upon the support and the other upon the base, actuating means for said connection, and means operatively connecting the support with said column.

13. In a lifting mechanism, a base, extensible sections therein including an operated and actuating section, means operatively connecting the actuating section with the other section, a flexible element interposed between the operated section and the base, said element being operatively connected with the actuating section, and operating means for said flexible element.

14. In a lifting mechanism, a base, extensible sections therein, a flexible connection interposed between the sections adapted to operatively connect one with the other, a flexible element interposed between the last mentioned section and the base and operatively associated with the other section and actuating means for said flexible element.

15. In a lifting mechanism, a base, extensible sections therein, means operatively connecting one of the sections with the other, a flexible element interposed between the last mentioned section and the base and having a yieldable anchor at one end, means operatively connecting said element with said last mentioned section, and operating means for said element.

16. In a lifting mechanism, a base, inner and outer extensible sections therein, means operatively connecting the outer section with the inner section, a flexible element interposed between the inner section and the base

and operatively connected with the outer section, and means for actuating said element.

17. In a lifting mechanism, a base, inner and outer extensible sections therein, a flexible connection interposed between the inner and outer sections whereby the latter is adapted to lift the former, a flexible element operatively connected with the outer section having one end yieldably connected with the inner section and the other connected with the base, and actuating means for said element.

18. In an extensible chair, a base, a column therein, a second column within the base, means operatively connecting the first mentioned column with the second column to effect raising of the latter, a pulley secured upon the base, a second pulley secured upon the first mentioned column beneath the first mentioned pulley, a flexible operating connection for said first mentioned column adapted to extend around said pulleys and having one end connected with the base and the other with the second mentioned column, and actuating means for said connection.

19. In an extensible chair, a base, inner and outer columns therein, means operatively connecting the outer column with the inner column to effect raising of the latter, pulleys carried by said base and said outer column, an arm projecting laterally from the inner column, a flexible connection engaging said pulleys and having one end anchored upon said arm and the other upon the base, and actuating means for said connection.

20. In an extensible chair, a base, inner and outer chair raising columns therein, an arm projecting laterally from the inner column to a point between the outer column and the base, a flexible element operatively connected with the first mentioned column and having one end connected with said arm and the other with the base, actuating means for said flexible element, and means operatively connecting the outer column with the inner column.

21. In an extensible chair, a base, inner and outer chair raising columns therein, an arm projecting laterally from the inner column to a point between the outer column and the base, a pulley secured upon the upper end of the base, a second pulley secured upon the outer column adjacent the bottom thereof, a chain extending around said pulleys and having one end anchored upon the base and the other upon said arm, a power shaft having a sprocket thereon operatively engaging said chain, and means operatively connecting the outer column with the inner column.

ADAM J. MAY.