

[54] **POWER OPERATED PEDESTAL TABLE
AND SAFETY CLUTCH THEREFOR**

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[58] Field of Search 108/20, 147; 248/406, 405,
248/404; 74/428.8, 89.15; 192/97, 150, 143,
141; 49/28, 26

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[57] **ABSTRACT**

A power-operated pedestal table having an extendable column for selectively varying the elevation of the table top. The column includes a pair of telescoping sections which are expanded and contracted by a power driven screw shaft. A one-way safety clutch automatically disengages the upper section from further downward movement under power when such downward movement is restrained by an obstruction such as, for example, an item of furniture or the operator himself.

14 Claims, 6 Drawing Figures

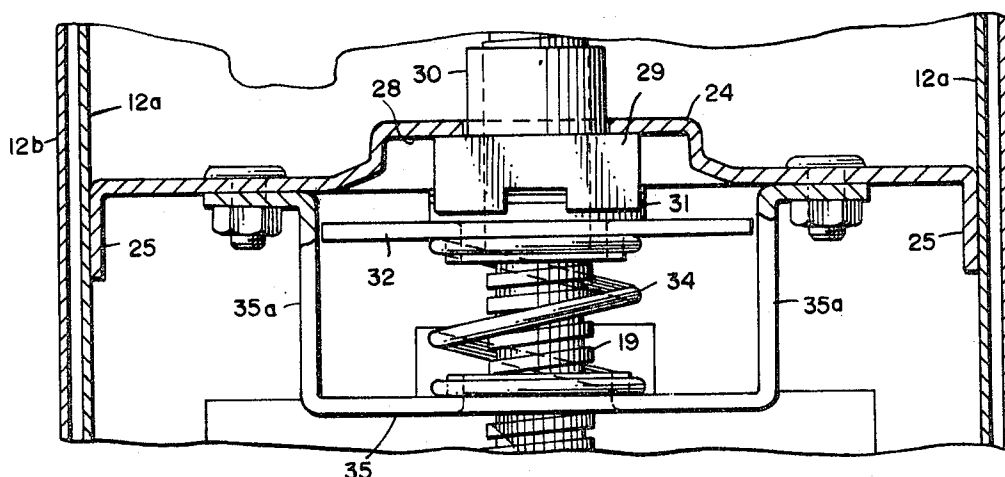


FIG. 1

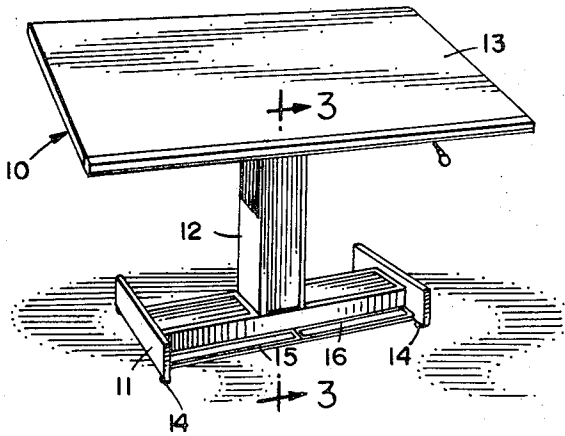


FIG. 2

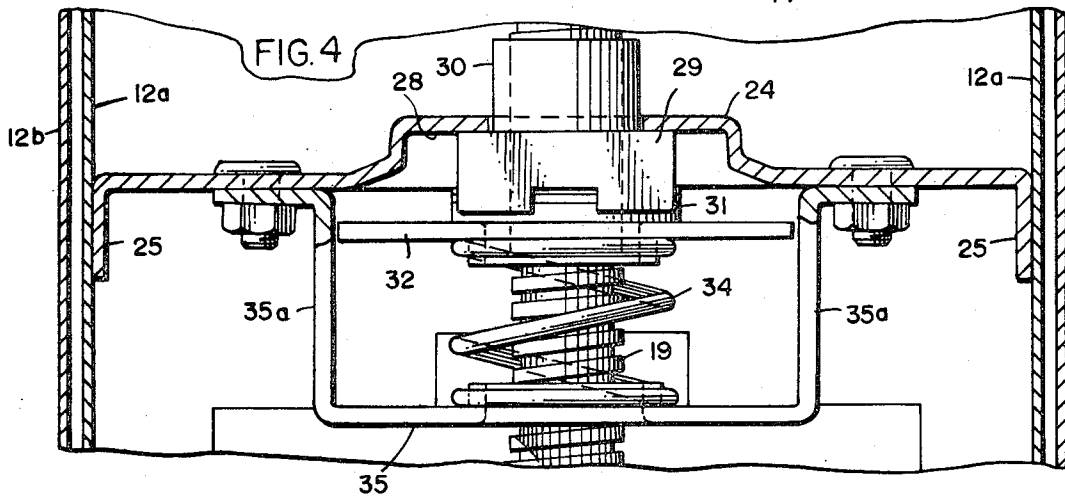
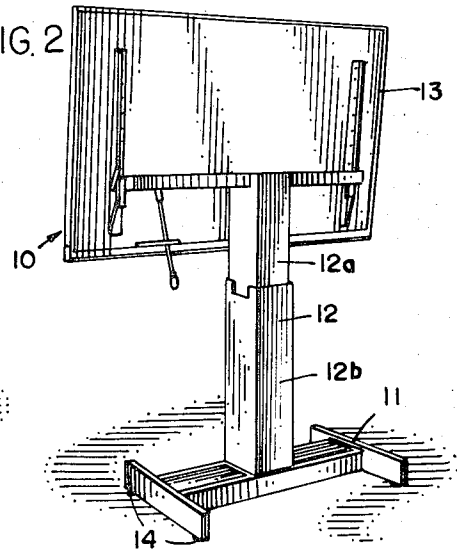
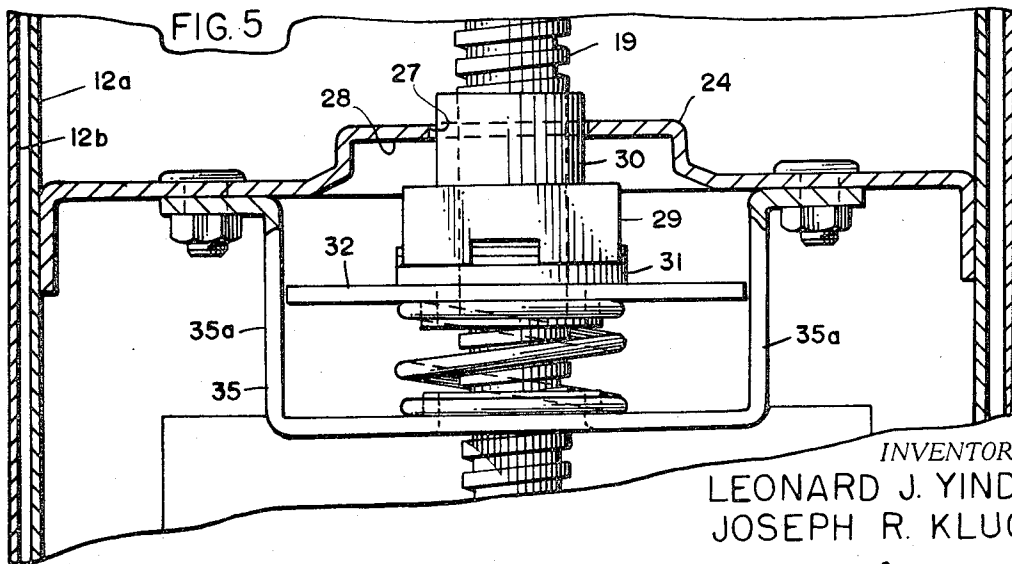
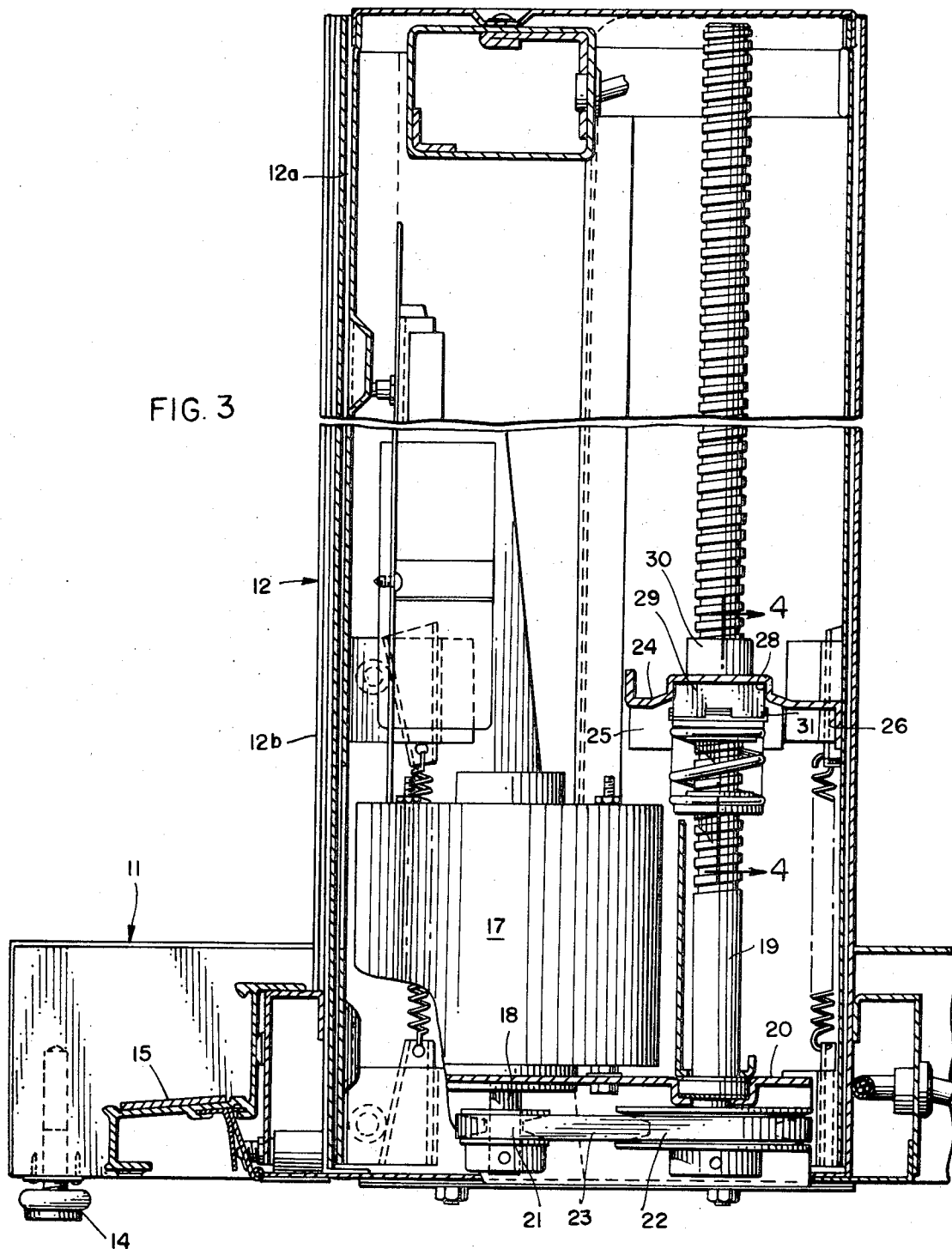


FIG. 5



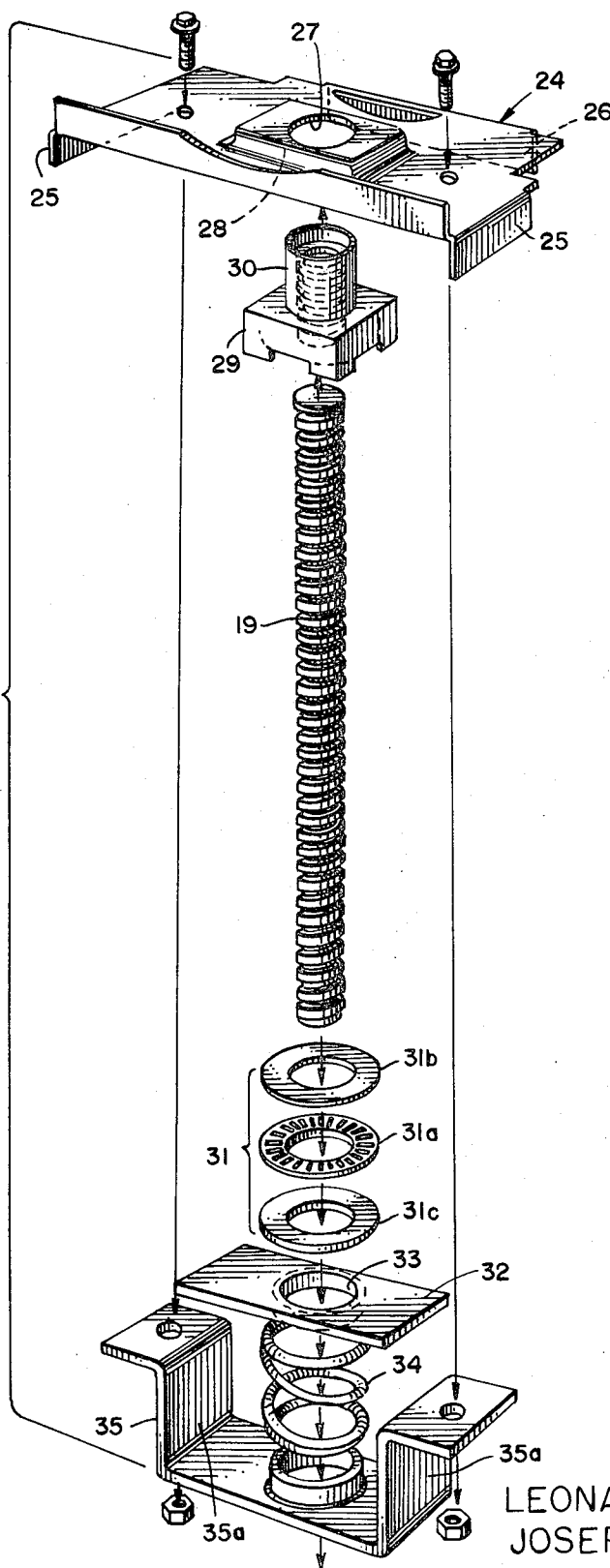
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FIG. 6



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POWER OPERATED PEDESTAL TABLE AND SAFETY CLUTCH THEREFOR

BACKGROUND

While power-operated tables, usually drafting or drawing tables, have been known in the past, the power units for such tables have ordinarily taken the form of accessories intended to provide power assistance for functions which would otherwise be performed manually. Since manually operated tables are usually counterbalanced, the power units suitable for converting such tables to power operation have been of relatively low power output. Because of such low power output, little danger has been presented should the top of such a table engage an obstacle as, for example, the knee of the operator, as the top is lowered.

The counterbalancing mechanism of a drafting table may be fairly complex and expensive. Furthermore, it may occupy considerable space and, if left exposed, may be unsightly, often noisy, and possibly dangerous. If such counterbalancing means is concealed, as illustrated in Grow et al. U.S. Pat. No. 3,140,559, then considerable cabinetry is necessary to complete such an enclosure, involving increased bulk, weight, and expense.

SUMMARY

A main object of the invention is to provide a vertically adjustable power-operated table which requires no counterbalancing and which, despite the relatively high power output of the driving unit, is safe and reliable in operation. Specifically, it is an object to provide a non-counterbalanced table which is provided with a highly effective one-way clutch permitting the top to be restrained against downward movement by an obstacle even though the motor continues to operate. Thus, danger is avoided even though, in the absence of such clutch, the power output of the driving means is great enough to crush many objects that might become trapped beneath the top as it is lowered.

The table includes a base which is adapted to rest upon a floor surface, a table top, and a vertical column extending between the top and the base. The column is hollow and has upper and lower telescoping sections which slide relative to each other as the top is raised and lowered. A motor is mounted in the lower of the sections and is equipped with a screw shaft extending upwardly into the upper section. The safety clutch assembly is mounted in the upper section and includes a horizontal plate secured to the upper section and having an opening through which the screw shaft extends. A nut is threaded upon the shaft and is normally disposed in a recess formed in the underside of the plate. As long as the nut remains in the recess, and is restrained by the walls of the recess against rotation upon the shaft, operation of the motor will cause a raising or lowering of the top. A compression spring supported by a bracket which is also fixed to the upper section exerts a constant force to retain the nut in the recess. However, should downward movement of the top be restrained by a force which exceeds the combined force of the spring and of gravity acting upon the top, continued rotation of the screw shaft will draw the nut out of its recess until it is free to rotate with the shaft, thereby releasing the top against further downward movement until the obstacle is removed.

Other objects and advantages will appear as the specification proceeds.

DRAWINGS

FIG. 1 is a perspective view of a pedestal table embodying the present invention;

FIG. 2 is a rear view of the table with the top in a generally vertical position to illustrate the central column construction;

FIG. 3 is an enlarged vertical sectional view taken along line 3—3 of FIG. 2;

FIG. 4 is a still further enlarged fragmentary vertical sectional view of the clutch assembly taken along line 4—4 of FIG. 3;

FIG. 5 is a sectional view similar to FIG. 4 but illustrating the clutch in a releasing position;

FIG. 6 is an exploded perspective view illustrating the various components of the clutch assembly along with the screw shaft for raising and lowering the table top.

DESCRIPTION

FIG. 1 illustrates a drafting table 10 consisting essentially of a base 11, a central supporting column 12 mounted upon the base, and a table top 13 supported by the column. To provide proper stability, the base has substantially greater width and depth than column 12. A plurality of shoes or glides 14 are provided by the base for engagement with a floor surface and a pair of foot pedals 15 and 16 are disposed along the front of the base for raising and lowering the table as will be described in greater detail hereinafter.

FIG. 2 illustrates the table with the top in a raised position — that is, with column 12 extended — and in a generally vertical position of adjustment. It is to be understood that the top may be tilted into any of a variety of selected angles of adjustment. Since the mechanism for such angular adjustability constitutes no part of the present invention, and since the top 13 is shown in a generally vertical position in FIG. 2 simply to reveal more clearly the construction of the extensible column 12, a more detailed description of that mechanism is believed unnecessary.

As shown in the drawings, the column 12 is hollow and consists of two telescoping sections 12a and 12b. Both sections are generally rectangular in cross sectional configuration, the upper section 12a being of smaller cross sectional dimensions and being slidably received within lower section 12b. The lower end portion of section 12b is rigidly secured to base 11 and houses an electric motor 17 having a vertical drive shaft 18 (FIG. 3). A vertical screw shaft 19 is disposed in the lower section and projects into the upper section 12a regardless of the position of adjustment of the upper section. As shown in FIG. 3, shaft 19 and motor 17 are both mounted upon a horizontal support member 20 which is in turn welded or otherwise secured to the lower column section and base. Pulleys 21—22 and belt 23 operatively interconnect the motor and threaded shaft 19; however, it is to be understood that other power transmitting means (such as gears, or chain and sprockets) might be used.

Referring to FIGS. 3, 4, and 5, it will be seen that a transverse plate 24 is disposed within the inner column section 12a at a point intermediate the upper and lower

limits of that section, such point preferably being about one-third up from the inner column's lower end. Plate 24 extends generally horizontally and has vertically turned side flanges 25 which are welded or otherwise permanently secured to the inside surfaces of the opposing side walls of section 12a. A downwardly turned rear flange 26 is similarly secured to the rear wall of the inner column section 12a.

The configuration of plate 24 is clearly shown in the exploded view of FIG. 6. The plate is provided with a central opening 27 through which screw shaft 19 projects, such opening being substantially larger than the shaft. The area about opening 27 is formed to define a downwardly facing recess 28 of generally rectangular configuration. A nut 29 of rectangular (square) cross sectional configuration is threaded upon shaft 19 and is dimensioned to be received within recess 28 and to be restrained against rotation by side walls of that recess. A guide sleeve 30 is formed integrally with nut 29 and is slidably received within central opening 27 of plate 24. The combined nut and guide sleeve may be formed of metal or any other suitable material; however, rigid plastic materials such as nylon have been found particularly effective because of their toughness, durability, quietness and self-lubricating qualities.

Beneath nut 29 is a thrust bearing 31 which, as shown in FIG. 6, consists of a bearing retainer 31a sandwiched between a pair of annular bearing elements or rings 31b and 31c. In the illustration given, a thrust plate 32 is disposed beneath bearing 31 and is centrally apertured at 33 to permit shaft 19 to pass freely therethrough although the guiding function of such plate may instead be achieved by providing nut 29 with a depending sleeve similar to sleeve 30 but extending downwardly through the thrust bearing. The thrust plate 32 and bearing 31 are urged upwardly by a helical compression spring 34 disposed between the plate and a U-shaped bracket 35. When the parts are fully assembled, bracket 35 is bolted or otherwise secured to the underside of transverse plate 24 and spring 34 is partially compressed to exert an upward force on nut 29, thereby normally holding the nut within its recess 28. It will be observed that thrust plate 32 is free to move vertically to a limited extent between side walls 35a of the bracket but is restrained against rotation about the axis of shaft 19 by such side walls.

FIGS. 3 and 4 illustrate the clutch in its normal engaged condition. Spring 34 bears upwardly to hold nut 29 within recess 28, at least a pair of side walls of the recess preventing rotation of the nut when shaft 19 is driven by motor 17. Consequently, when the reversible motor is operated in one direction to raise the table, nut 29 rides upwardly along the threaded shaft, carrying with it transverse plate 24 and upper telescoping section 12a. When lowering of the table is desired, the direction of rotation of shaft 19 is reversed and the upper column section 12a descends as the nut 29 travels downwardly along the threaded shaft.

It is believed apparent from the foregoing that nut 29 and shaft 19 support the entire weight of table top 13, the upper telescoping column section 12a, and all of the parts and accessories which are or may be connected to such elements. Since the top is not counterbalanced, considerable power is required to lift the top, especially if it is of large size and supports equipment

such as drawing machines, lamps, and the like. Effective results have been achieved using a motor rated at one fourth horse power although motors of even greater power may be considered necessary or desirable where the table top is unusually large or heavy.

The self-releasing one-way clutch assembly protects against damage or injury that might otherwise be caused when the table top is lowered by a relatively powerful motor. Should the downwardly traveling top engage an obstruction, such as a piece of furniture or the knee of the operator, continued rotation of threaded shaft 19 will cause nut 29 to continue its downward travel until the nut clears recess 28. Thus, as soon as the downwardly traveling top meets a resistance which exceeds the combined weight of the top and upper column section coupled with the compressive force of spring 34, downward movement of the top will cease. The spring serves as a preloading element and is therefore selected to have a compressive force which does not exceed a predetermined safety level. Because of the spring, forces of lower magnitude will not cause the clutch to release and, therefore, the table top is stable and does not respond by moving upwardly upon the application of minor impact forces. However, to protect against injury to a user, or damage to adjacent furniture or other items that might be engaged by the descending top, a spring should be selected with a compressive force that will exert, in addition to the weight of the table top, a downward force not exceeding approximately 50 or 60 pounds.

Spring 34 also provides the resilience needed to urge the nut 29 to reseat in its recess in plate 24 when the motor is reversed following safety functioning of the clutch. In other words, the upward force of the spring overcomes frictional resistance between the nut 29 and screw 19 which might otherwise cause the nut to rotate with the reversely rotating screw and to fail in reseating within the recess, it being assumed in such a case that the obstruction remains to block lowering of the top.

It will be noted that guide sleeve 30 has a greater vertical extent than the side walls of recess 28. Therefore, when the clutch is released as illustrated in FIG. 5, the upper portion of sleeve 30 remains within opening 27 to guide the nut back into position within recess 28 when the restraining force is removed or when rotation of shaft 19 is reversed.

While in the foregoing we have disclosed an embodiment of the invention in considerable detail for purposes of illustration it will be understood by those skilled in the art that many of these details may be varied without departing from the spirit and scope of the invention.

We claim:

1. A power-operated pedestal table comprising a base adapted to rest upon a floor surface, a table top, and a vertical column extending between the top and the base, said column being hollow and including upper and lower telescoping sections, a motor mounted in one of said sections and equipped with a vertical screw shaft extending into the other of said sections, and a safety clutch assembly mounted in said other of said sections, said assembly including a horizontal plate secured to said other section and having an opening through which said screw shaft extends, and a nut threadedly carried by said shaft and disposed on one

side of said plate facing said one section, said plate providing a recess on said one side thereof for receiving said nut and restraining rotation of the nut when said shaft is rotated by said motor, said nut being withdrawn from said recess by continued rotation of said shaft in a direction for lowering said top when downward movement of said top is blocked by an obstacle.

2. The structure of claim 1 in which means are provided for urging said nut towards said recess.

3. The structure of claim 2 in which said means includes a bracket fixed relative to said plate and facing said recess, and a compression spring of preselected compressive force disposed between said bracket and said nut for urging said nut towards said recess, whereby, release of said safety clutch requires a restraining force upon said table top exceeding the compressive force of said spring and the weight of said top.

4. The structure of claim 3 in which said means also includes an anti-friction thrust bearing interposed between said spring and said nut.

5. The structure of claim 1 in which said opening in said horizontal plate is substantially larger than said shaft, a guide sleeve secured to said nut and projecting into said recess and through the opening in said plate for guiding movement of said nut into and out of said recess.

6. The structure of claim 1 in which said nut is formed of a rigid plastic material.

7. The structure of claim 5 in which said nut and sleeve are integrally formed of a rigid plastic material.

8. A power-operated pedestal table comprising a base adapted to rest upon a floor surface, a table top, and a vertical column extending between the top and the base, said column being hollow and including upper and lower telescoping sections, a motor mounted in said lower section and equipped with a screw shaft extending upwardly into said upper section, and a safety

clutch assembly mounted in said upper section, said assembly including a horizontal plate secured to said upper section and having an opening through which said screw shaft extends, and a nut threadedly carried by said shaft beneath said plate, said plate providing a non-circular recess on its underside receiving said nut and normally restraining rotation of the same when said shaft is rotated by said motor, said nut being withdrawn from said recess by continued rotation of said shaft in a direction for lowering said top when downward movement of said top is blocked by an obstruction.

9. The structure of claim 8 in which means are provided for urging said nut towards said recess.

10. The structure of claim 8 in which said means includes a bracket fixed relative to said plate and disposed therebeneath, and a compression spring of preselected compressive force disposed between said bracket and said nut for urging said nut upwardly towards said recess, whereby, release of said safety clutch requires a restraining force upon said table top exceeding the compressive force of said spring and the weight of said top.

11. The structure of claim 10 in which said means also includes an anti-friction thrust bearing disposed between said spring and said nut.

12. The structure of claim 8 in which said nut and said recess are of generally rectangular horizontal cross sectional configuration, and a guide sleeve extending upwardly from said nut and through the opening in said horizontal plate, said guide sleeve having vertical dimensions greater than the depth of said recess for guiding said nut into and out of said recess.

13. The structure of claim 12 in which said guide sleeve and said nut are formed integrally.

14. The structure of claim 13 in which said nut and guide sleeve are formed integrally of rigid plastic material.

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