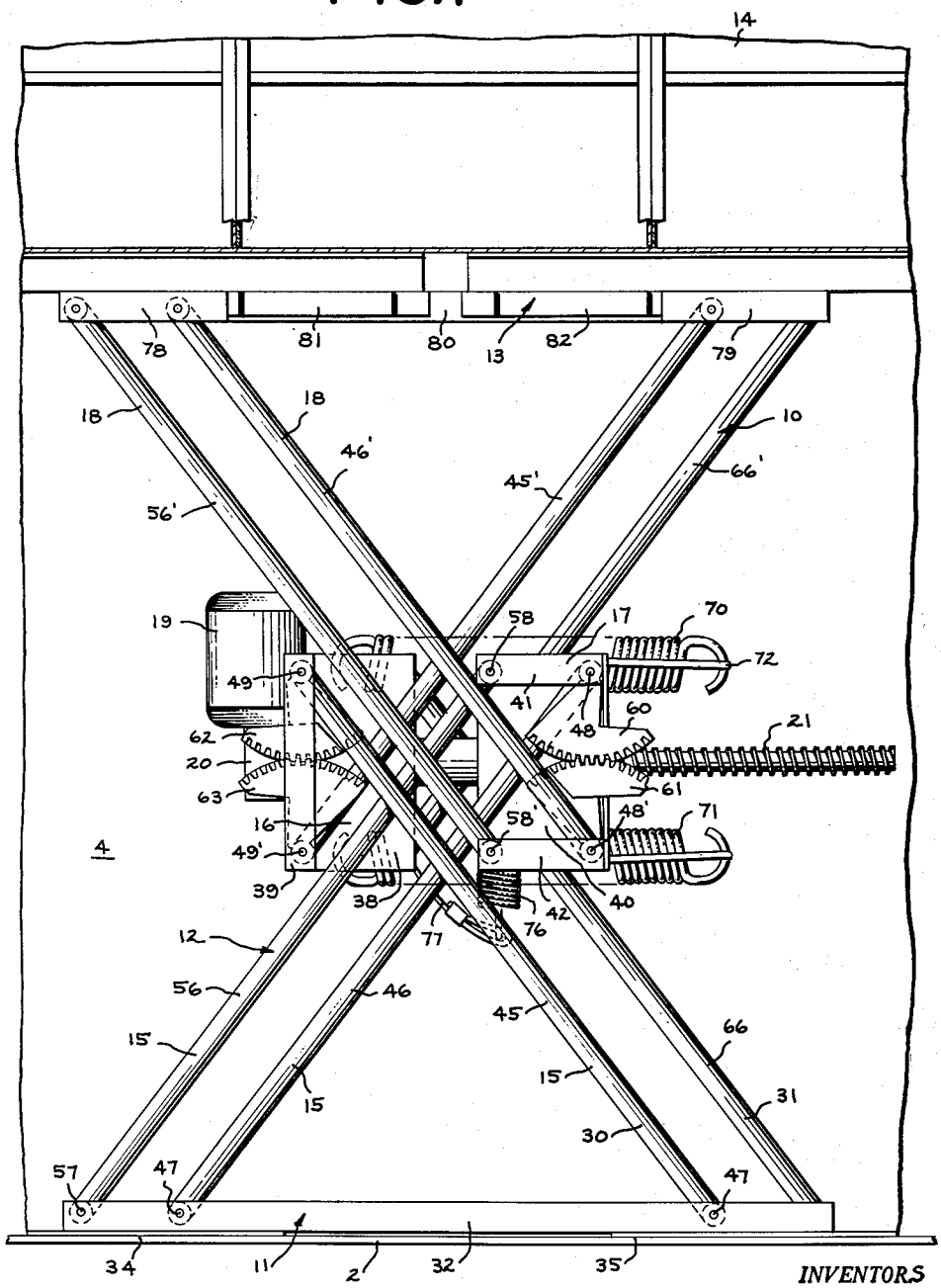
Jan. 7, 1964 F. W. MOORE ETAL 3,116,910

PARALLELOGRAM LIFT MECHANISM

Filed Oct. 4, 1961 3 Sheets-Sheet 1

FIG. 1



INVENTORS
FRED W. MOORE
& ROBERT C. PRESSLEY JR.
BY
Richard L. Coslin
THEIR ATTORNEY

Jan. 7, 1964 F. W. MOORE ETAL 3,116,910

PARALLELOGRAM LIFT MECHANISM

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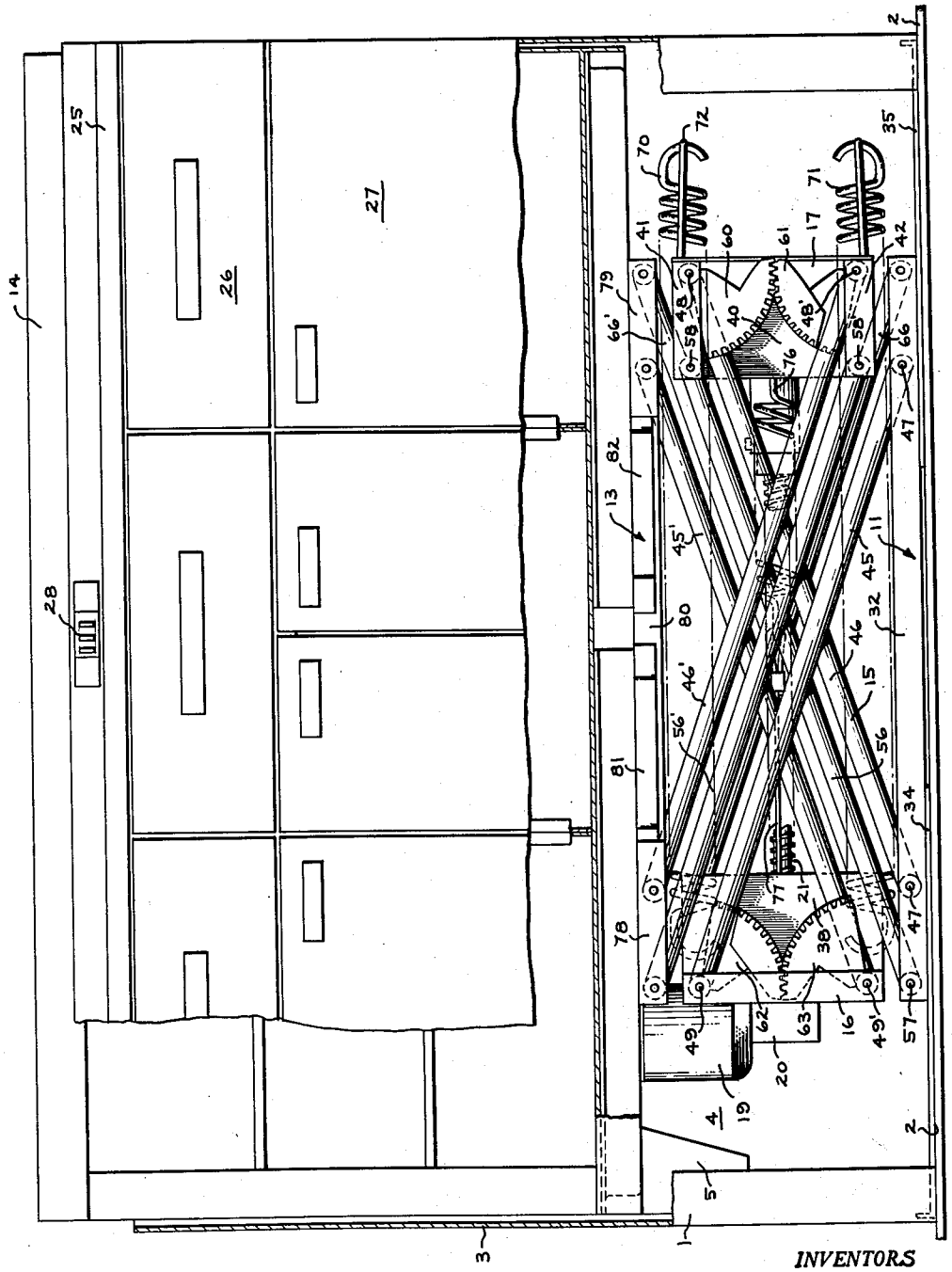


FIG. 2

INVENTORS

FRED W. MOORE

& ROBERT C. PRESSLEY JR

BY Richard L. Caslin

THEIR ATTORNEY

Jan. 7, 1964 F. W. MOORE ETAL 3,116,910

PARALLELOGRAM LIFT MECHANISM

Filed Oct. 4, 1961 3 Sheets-Sheet 3

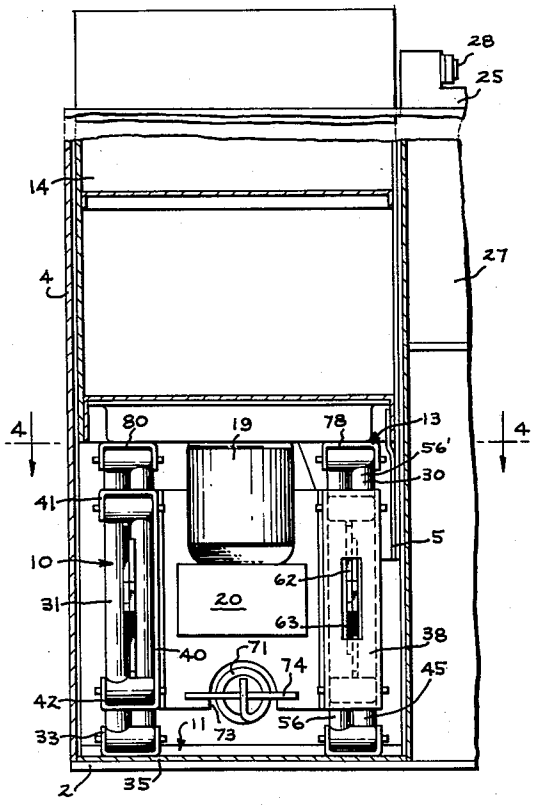


FIG. 3

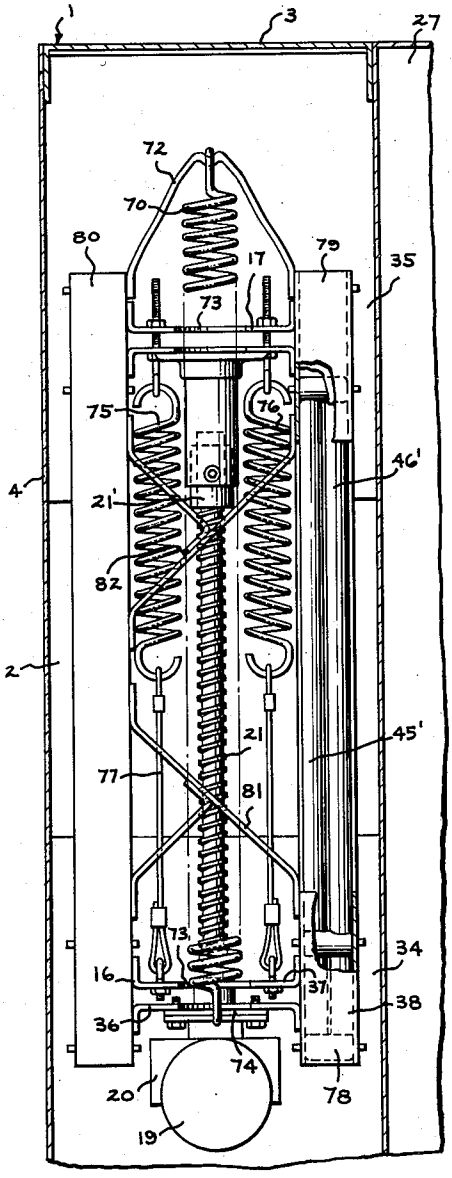


FIG. 4

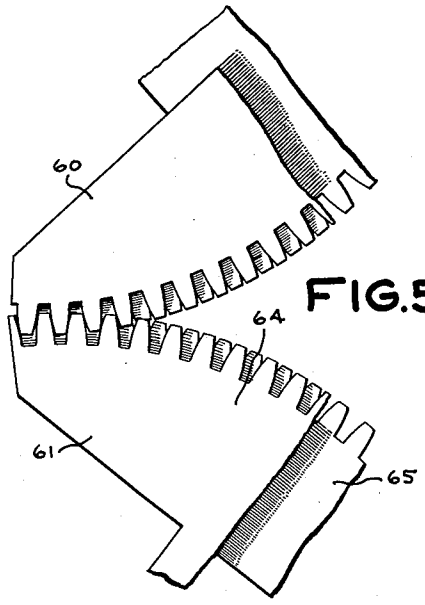


FIG. 5

INVENTORS

FRED W. MOORE

& ROBERT C. PRESSLEY JR

BY Richard L. Caslin

THEIR ATTORNEY

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3,116,910

PARALLELOGRAM LIFT MECHANISM

Fred W. Moore, Louisville, and Robert C. Pressley, Jr., Anchorage, Ky., assignors to General Electric Company, a corporation of New York

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8 Claims. (Cl. 254—126)

The present invention relates to a low-powered motor-driven lift mechanism for carrying heavy duty loads, and particularly to a parallelogram type, precision, lift mechanism having a smooth acting, level, straight line stability irrespective of unbalanced loads.

Many attempts have been made in the past to provide power-operated lift mechanisms for kitchen storage cabinets, household and office furniture, and large electric appliances; but none of these designs are known to have gained commercial acceptance. One of the main problems in designing a powered, lift mechanism for use in the home, and particularly for disappearing kitchen cabinets, is to eliminate the necessity for a cumbersome framework or superstructure for guiding the cabinet in the upper portion of its movement. Another stumbling block heretofore has been the high cost of providing a powered, lift mechanism, which emphasizes the importance of having an efficient power transmitting system so that the smallest amount of energy may be used to drive the system.

The principal object of the present invention is to provide a simple design of a stable parallelogram type, precision, lift mechanism that is capable of moving a heavy load in a smooth, straight-line manner without the use of an overhead supporting and guiding superstructure for the load.

A further object of the present invention is to provide a low powered, motor-driven, counterbalanced, lift mechanism where the mechanism may be folded to a space saving, compact size and may be raised to a substantial height without the use of a separate overhead guiding framework for the load to be carried thereby.

A further object of the present invention is to provide a powered cabinet structure for replacing the conventional wall-hung cabinets with movable shelves that may be positioned at eye-level for loading and unloading purposes.

A still further object of the present invention is to provide a parallelogram type lift mechanism with spring means for compensating for the loss in moment arms as the mechanism folds into a compact size to facilitate the ease of raising the load.

The present invention, in accordance with one form thereof, embodies a parallelogram type lift mechanism comprising a base member, a parallelogram linkage system supported on the base, and a platform carried by the linkage system. The linkage system includes a pair of center blocks which are joined together by a power means for effecting the movement of the center blocks toward and away from each other. There are pivoted jack legs connecting the base to the center blocks, and in turn the center blocks to the platform. Some of the jack legs are formed as part of a parallelogram linkage arrangement to insure level, straight-line motion of the platform. Other important refinements have been discovered which increase the value and efficiency of this mechanism and all of them may or may not be used depending upon the degree of perfection desired. The design is so made that the mechanism is adapted to fold into a minimum compact size so as to waste as little space as is possible for accommodating the lift mechanism, while at the same time being capable of supporting a heavy duty load. Moreover, it is desirable to have a generally uniform load on the motor in both vertical movements of the load.

This may be accomplished by providing counterbalance spring means coupled between the center blocks so that the springs are energized as the platform is lowered, thereby requiring a positive driving force to bring the load to its lowered position. This potential energy stored in the counterbalance springs is translated to an upward force tending to reduce the amount of energy required from the motor to raise the load by compensating for the changes in the moment arms of the legs or levers of the mechanism. Moreover, secondary spring means may be provided to retard the downward movement of the platform near the end of its descent, as well as to alleviate the effect of the worse torque position when the mechanism is collapsed so that the mechanism may be collapsed further.

Our invention will be better understood from the following description taken in connection with the accompanying drawings and its scope will be pointed out in the appending claims.

FIGURE 1 is a front elevational view of a parallelogram type lift mechanism embodying the present invention showing it in its extreme raised position and supporting as its load a disappearing, open-front, kitchen cabinet.

FIGURE 2 is a front elevational view partly in cross-section showing the lift mechanism in its extreme lowered position with a kitchen cabinet lowered behind a kitchen counter cabinet.

FIGURE 3 is a left side elevational view of the arrangement of FIGURE 2 with parts broken away to show the nature of the disappearing kitchen cabinet hidden behind a small portion of the kitchen counter cabinet.

FIGURE 4 is a top plan view taken on the line 4—4 of FIGURE 3 showing the lift mechanism in its extreme lowered position with both the counterbalance spring means and the secondary spring means fully extended.

FIGURE 5 is a fragmentary view of an enlarged scale of a pair of interlocking gear segments that are connected between the jack legs of both the upper and lower groups of legs to reduce the play in the mechanism and insure the positive movement of the upper jack legs as the lower legs move.

Referring in detail to the drawings and in particular to FIGURE 1, there is shown a parallelogram lift mechanism 10 in its fully extended upper position. This mechanism comprises basically a lower base member 11, a split-leg parallelogram linkage system 12 connected to the base, and an upper platform 13 supported by the linkage system. The particular load being carried by this lift mechanism is shown as a disappearing kitchen cabinet 14, although it should be understood that this invention has wide utility with any type of heavy load where it is important that the mechanism be motor-driven, low powered, smooth running and linear acting without requiring the use of auxiliary supporting framework for guiding the load during its upper movements. This lift mechanism is termed a parallelogram type mechanism because it incorporates pivoted jack legs such as 15 for joining the lower base 11 to a pair of center blocks 16 and 17, respectively; and these center blocks are in turn connected to the upper platform 13 by a second group of jack legs such as legs 18. Some of the jack legs 15 and 18 are arranged in pairs to form parallelograms that insure the stability and leveling of the platform as will be explained fully hereinafter.

A small electric motor 19 on the order of a 1/6 or 1/8 H.P. series motor that runs on ordinary house wiring circuits of 118 volts, A.C., at 15 amperes or less, is mounted on one of the center blocks such as center block 16 and it is connected through a gear reduction unit 20 to one end of a screw shaft 21 which extends from one center block to the other and is coupled to the second

center block 17 through a threaded nut assembly 21', as is best seen in the top plan view of FIGURE 4. Thus, the overall operating principle of this lift mechanism is related to that of a scissors jack since the screw shaft 21 is turned by an external force, in this case an electric motor, for spreading or contracting the center blocks 16 and 17 to either lower or raise the load-supporting platform 13 respectively. The simple types of automobile scissors jacks are quite suitable for lifting heavy loads for a short height, but the platform of this type of jack tends to rock as it moves rendering it unsatisfactory in many applications requiring horizontal accuracy in lifting. Another disadvantage they have is that they are satisfactory for only short lift movements unless they are constructed in giant sizes. This would not be acceptable for the various applications contemplated for the present invention.

FIGURES 2 and 3 show this invention incorporated with a portion of a kitchen counter or work surface 25 under which is built the usual drawers 26 and swinging cabinet doors 27 for gaining access to the storage shelves may either be a 16" or 24" depth with the disappearing cabinet positioned therebehind of a depth of approximately 12" and supported on the lift mechanism 10. A control switch panel 28 is located at the back of the counter 25 within easy reach of a person standing in front of the counter and it has switch positions for raising, lowering, and stopping the cabinet 14 from moving. The lift mechanism 10 and the supported cabinet 14 are housed in a close-fitting box-like structure 1 having a bottom wall 2, side walls 3, and a back wall 4. The bottom of the cabinet 14 is provided with two downward extensions 5 in the front corners thereof as seen in FIGURE 2 to stabilize the cabinet in its extreme raised position of FIGURE 1 because of the small depth 12" of the cabinet. The weight of a loaded cabinet presents a great deal of force to overcome in the front to back direction when the cabinet is raised. Mention is made here that this guiding and stabilizing box structure does not rise above the top of the lowered position of the cabinet 14 and it does not obstruct the view over such cabinet.

This is perhaps an appropriate time to consider the question of the utility of a disappearing kitchen cabinet for cooperation with the kitchen counter. Unfortunately, most of the standard kitchen cabinets have some uppermost and lowermost shelves which are inconvenient to reach by the average housewife. This is not only true of the wall-hung cabinets but it is likewise true of the floor-mounted kitchen counter cabinets. The problem involved here is that the back area of the shelves in the counter cabinets and especially the lower shelves are oftentimes scarcely used at all, while the top shelves in the wall-mounted cabinets are difficult to reach so that these shelves are used mostly for dead storage and not for everyday use. This led to a conclusion that it might be possible to design a more efficient raisable cabinet which could disappear behind the counter cabinet when out of use, and which may be raised at will from behind the counter cabinet so that each shelf in the raisable cabinet may be positioned at eyelevel and within easy reach of the housewife at the touch of a switch for loading and unloading of the shelves. Because of the increased utilization of this raisable cabinet, it was felt possible to save on the number and expense of cabinets used in the kitchen so that this saving could be applied to the cost of furnishing the power unit necessary for moving the cabinet. Another important advantage of a powered lift cabinet is that it can be installed under a window, in the middle of the kitchen floor as an island concept, or it may be used as a pass-through room divider that is usable, for example, between the kitchen and a family room. In other words, a powered storage cabinet is not limited in its utility to a wall area as are wall-hung cabinets.

As in most successful commercial lines of products the economics of the design played an important role. It was felt from the beginning that the lift mechanism must be a free-standing mechanism which is capable of carrying its load; namely, the raisable cabinet without adding any auxiliary guides or superstructure to stabilize the upper movement of the load which might detract from the appearance of the cabinet and render it an eyesore. Moreover the design must be quiet in operation, smooth running, always level even with unbalanced loads, sensitive to the instant control of the housewife, capable of excessive overloads, and usable with many different sizes and shapes of cabinets whether they be straight cabinet sections or corner cabinets. As this design evolved and proved so successful in meeting all of the basic requirements of a lift mechanism of this type many other applications for this lift mechanism were conceived and thought practical. For example, the lift mechanism could be mounted in a coffee table for raising the top of the table to standard table height so that it could be used during meal time. The lift mechanism could be hung from the ceiling for lowering the load into reach rather than raising it as shown. Modern retail stores and large department stores could also make use of many such disappearing cabinets or display shelves.

One of the most significant contributions of this invention is the novel split-leg parallelogram linkage system which permits the rigid stability of the design without front-to-back or side-to-side swaying of the load during its movement. Turning now to a consideration of FIGURES 1, 3, and 4, it will be clear that the lift mechanism is provided with lower jack legs 15 and upper jack legs 18. These legs are divided into two frames, a front frame 30 and a back frame 31 as can be seen in the side view of FIGURE 3. These two frames are joined together to form a unitary four cornered construction by means of the center blocks 16 and 17 which will be explained further hereinafter. The base 11 is formed by a pair of parallel upstanding channel beams 32 and 33 which are connected together at their ends by spaced underlying supporting plates 34 and 35 (FIGURE 1). The channel member 32 cooperates with the front frame 30 while the channel 33 cooperates in a similar manner with the back frame 31.

The center blocks 16 and 17 are similar in construction but they are assembled in the mechanism in a reverse manner. Looking first at FIGURE 4, the center block 16 comprises a pair of vertically arranged, back-to-back, wide channel plates 36 and 37 which are spaced apart from each other for connection at their ends to a pair of side plates of dissimilar shape. The frontmost side plate is side plate 38 shown in FIGURE 4 to be of generally L-shape in plan view where the base of the L is turned upwardly at its end to provide a side flange 39 to serve as the bearing means for a pivotal connection with some of the jack legs of the lower and upper groups of legs 15 and 18, respectively. The side plate 40 on the back side of the center block 16 is of generally reversed C-shape in elevational side view as seen in FIGURE 3 to provide top and bottom flanges 41 and 42 respectively for serving as bearing means for the jack legs. The side plates 38 and 40 of the center block 16 are arranged in the reverse order in the other center block 17. Side plate 40 is in the front as is seen in FIGURE 1 while the side plate 38 is at the back of the block 17.

The lower group of jack legs 15 in the front frame 30 is represented by two oppositely inclined criss-crossed legs 45 and 46 which are each pivotally joined to the channel beam 32 of the base by pivot pins 47. The left hand leg 46 is connected at its upper end as at 48 to the top flange 41 of the right hand center block 17. This is to be compared with the right hand jack leg 45 which is pivotally connected as at 49 at the top of the flange 39 of the J-shaped side plate 38 of the left hand center block 16. The back frame 31 is provided with

a similar pair of oppositely inclined jack legs (not shown) for connecting the base to the center blocks in a similar manner.

It is apparent that the center blocks **16** and **17** must be connected to the load supporting platform **13**. This is accomplished by the jack legs **18** in the upper group identified as **45'** and **46'**. Notice the jack leg **46'** is connected to the center block **17** at the pivotal connection **48'** which is directly below connection **48** of leg **46**, while the jack leg **45'** is connected to the center block **16** by the pivotal connection **49'** which is directly below connection **49**. Accordingly it will be understood that the pivot points of the jack legs for the upper and lower groups **18** and **15** respectively, where they are connected to the center blocks, are vertically separated from each other to obtain maximum leverage efficiency while making it possible to obtain a more compact unit in the closed position as can be appreciated by studying FIGURE 2. The back frame **31** is provided with a similar pair of oppositely inclined jack legs (not shown) for connecting the center blocks to the platform.

The design explained above stands incomplete in that it would display wide excursions of the jack legs during the vertical movement of the platform. It lacks rigidity and stability but this shortcoming can be overcome by a split-leg parallelogram linkage system which will now be explained. One parallelogram is in the lower group of jack legs **15** on the front frame **30** and it is established by the addition of a second jack leg **56** pivotally connecting together the base **11** with the center block **17**. This jack leg **56** is arranged parallel to the jack leg **46** and is of equal length. The lower end of the jack leg **56** is pivotally connected to the channel **32** as at **57** while the upper end is pivotally connected to the top portion of the center block **17** as at **58** on a horizontal line from connection **48**. It should be understood that the back frame **31** does not have a comparable parallelogram linkage arrangement directly behind the legs **46** and **56**, but instead has such a parallelogram arrangement in the directly opposite far corner from the legs **46** and **56**. For example, the additional parallel leg that is comparable to leg **56** is seen in FIGURE 1 and is identified as leg **66**.

This parallelogram linkage means connecting the base **11** with the center block **17** must of course be carried from the center block **17** to the platform in order to gain the maximum benefit from such a design. Accordingly, there is an additional jack leg **56'** in the upper group of jack legs **18** for connecting the center block **17** to the platform **13**. This additional jack leg **56'** is pivotally connected to the center block **17** as at **58'** at a point spaced directly beneath the pivotal connection **58** for the top portion of the leg **56**. Again it should be understood that the back frame **31** does not have a mirror image of the jack legs **46'** and **56'** but instead such a parallelogram linkage arrangement is arranged in the exact opposite far corner and the additional jack leg that is seen in FIGURE 1 is identified as **66'**.

To explain briefly, the split-leg parallelogram linkage system has the effect of four pairs of parallelogram linkage arrangements on the front frame **30** and four like pairs on the back frame **31**, except that certain jack legs have been removed; namely, one jack leg from two of the opposed far corners in the lower group **15** of jack legs and two similar legs have been removed from the top group of jack legs **18** in the same two corners when viewed in plan view. These corners may be identified as the right hand corner of front frame **30** and the left hand corner of the back frame **31**. Such an elimination of certain of the jack legs is desirable, as may be appreciated by studying the fully collapsed position of FIGURE 2, in that the lift mechanism is more compact in the fully closed position so that a maximum height is available for the disappearing kitchen cabinet **14**. Certain jack legs may be eliminated by using special force transmitting gear segments **60** and **61** (FIGURES 1, 2 and 5) acting between jack legs **46** and **46'** respectively, and gear segments **62** and **63** acting between the jack legs **45** and **45'** respectively of the front frame **30**. Of course, it should be understood that comparable gear segments are found on the back frame **31**. It should also be noted that these gear segments are connected between the jack legs of the lower group **15** and the upper group **18**, and particularly those single jack legs which were originally described as connecting the base to the center blocks and the center blocks to the platform. In other words they are not connected between the additional jack legs which establish the parallelogram linkage arrangement. Moreover, these gear segments are not mere segments of spur gears but as is clearly illustrated in the enlarged view of FIGURE 5 the gears are interlocked gears each formed by taking two identical gear segments **64** and **65** and placing them side-by-side and then shifting them so that the gear teeth of one overlie the space between the gear teeth of the other in which position they are fastened together. The same is done with the mating gear segment and accordingly it will be understood that when these gear segments are intermeshed they not only transmit the turning force from one jack leg to the other, but they also prevent play or wobbling of the legs as the pivotal movement takes place.

Some of the stability of this mechanism has been obtained by providing a rubbing or bearing action between the various jack legs where they criss-cross each other. For example the inner side of the leg **45** bears against the side of legs **46**, **56** and **45'**. Moreover, the outer side of leg **46** bears against legs **45**, **56'** and **46'**. Lastly, the outer side of leg **56** bears against legs **45**, **56**, and **46'** which is the same as leg **46** as explained above. The channels **32** and **33** are of a width equal to two of the jack legs. Each leg has a bearing at both ends that is of double width. Some legs are right hand legs and some are left hand legs. In other words, each leg has the same type of bearing but some legs are disposed at one side of the bearing and the complementary legs are disposed at the opposite side of their bearings.

It must be remembered that a typical load for this type of mechanism might easily amount to 500 pounds and it requires a great deal more energy to raise the load than is necessary to lower the load, for the same reason that a wagon is much harder to push uphill than it is to push downhill. Understandably, the drive motor **19** must be capable of handling the maximum force exerted by the load, namely when the load is being raised. Moreover, a smaller motor would be required and smaller structural members could be used for the lift mechanism if the load on the jack could be more nearly balanced so that the lowering load more nearly approaches the lifting load. This objective has been accomplished by using counterbalance springs such as upper and lower coil springs **70** and **71** in FIGURE 1 which are connected between the two center blocks **16** and **17** by means which is best shown in the top plan view of FIGURE 4. The springs are energized or loaded on the descent of the load so that a positive force provided by the motor is necessary to force the load down due to the stiffness of the counterbalance springs **70** and **71**. In other words, potential energy is stored in these springs as the kinetic energy of the load is expended as it moves from the top position to its lowest position. This potential energy in the counterbalance springs is released to assist the motor in lifting the load and serves to compensate for the lesser moment arms of the jack legs when the mechanism is in the collapsed position of FIGURE 2. It is this available energy or potential energy in the counterbalance springs that serves to equalize the load exerted on the drive motor in both directions of rotation so that a smaller rated and lower cost fractional horsepower motor may be used as the prime mover. The top spring **70** is connected at one end

to the center block 17 by means of a fixed outer loop or strap member 72 that is fastened at its ends between the two side plates 38 and 40. The two channel plates 36 and 37 of the center block 16 must be cut back as at 73 in FIGURE 3 in order to make room for the springs 70 and 71 to extend therethrough. The opposite end of the spring 70 is connected to a strap 74 that is fastened to the channel plate 36 in the vicinity of the cutback portion 73. Attention is drawn to the fact that the counterbalance springs 70 and 71 are in tension while the mechanism is in the extreme lowered position of FIGURES 2 and 4 but they exert little or no force when the mechanism is in the raised position of FIGURE 1.

Supplementary springs 75 and 76 are also used to act only during the last few moments of the downward movement of the load to throw a load onto the motor as a braking force as well as to assist the motor in breaking the load loose from its dead inertia position and getting the load started in the upward direction. These auxiliary springs 75 and 76 are each connected at one end to the center block 17 and at the other end to a length of flexible cable 77 which is in turn joined to the opposite center block 16. When the lift mechanism is in its raised position of FIGURE 1 the center blocks 16 and 17 will be arranged quite close together and the auxiliary springs 75 and 76 will hang quite limp due to the action of the flexible cables 77. The spring 76 can be seen in FIGURE 1 as it dangles from the cable 77.

As mentioned previously it is important to develop this lift mechanism into a design that has maximum utility. In the kitchen cabinet art this would be accomplished if the mechanism would not only lift a standard straight section of cabinets but would also handle a corner section. This has been made possible by the use of a special shaped platform 13 having a large V-shaped notch in the front face as is best seen in the top plan view of FIGURE 4. The platform 13 has as its front side a pair of shortened downturned channel beams 78 and 79 (FIGURE 1) for cooperating with the jack legs of the front frame 30, as well as an elongated downturned channel beam 80 (FIGURE 4) for cooperation with the jack legs of the back frame 31 of the mechanism. Cross braces must be used between the channel beams 78, 79, 80 in order to rigidify the structure. These cross braces are represented by the two Y-shaped strap members 81 and 82 where the leg and one arm of each Y is connected to the elongated channel beam 80. The other arm of Y is connected to one of the shortened channel beams 78 or 79. These cross braces are so positioned that they establish a rather large V-shaped notch in the front face of the platform which is designed to avoid interference with the corner of the kitchen counter in the area adjacent to the corner cabinet. Because of this notched feature of the platform 13 it is possible to utilize a single design of lift mechanism for accommodating all of the different types of cabinets which may be supported by the lift mechanism.

Having described above the many important contributions to the art of precision, lift mechanisms as well as to the art of raisable kitchen cabinets, furniture and appliances it will readily be apparent to those skilled in this art that this lift mechanism is first and foremost a heavy duty, low powered unit that has many other important features such as simplicity of design, stability, rigidity, smooth action, ruggedness, and long life.

Other modifications of this invention will occur to those skilled in this art and it is to be understood, therefore, that this invention is not limited to the particular embodiments disclosed but that it is intended to cover all modifications which are within the true spirit and scope of this invention as claimed.

What we claim as new and desire to secure by Letters Patent of the United States is:

1. A lift mechanism comprising a base, first and second movable center blocks, a load carrying platform, a first pair of pivoted jack legs joining said base to said first center block, a second pair of pivoted jack legs joining said base to said second center block, said second pair of pivoted jack legs being inclined to extend across said first pair of jack legs, a third pair of pivoted jack legs joining said first center block to said platform, a fourth pair of pivoted jack legs joining said second center block to said platform and being inclined to extend across said third pair of jack legs, and spring means fastened between said first and second center blocks to be substantially de-energized when the lift mechanism is in its extreme raised position and tensioned as the mechanism is collapsed to build up potential energy that is available when the mechanism is being raised.

2. A lift mechanism as recited in claim 1 wherein said load carrying platform is formed with a large V-shaped notch in the front edge thereof to accommodate a load which is right angular in plan view and is adapted to extend around a corner.

3. A lift mechanism as recited in claim 1 further comprising intermeshed gear segments with overlapping teeth fastened between certain of said jack legs of the first or second pair and the third or fourth pair to provide increased stability to the mechanism.

4. A parallelogram type lift mechanism comprising a rectangular shaped base plate, a split-leg parallelogram linkage system and an upper platform, the mechanism including a pair of relatively movable center blocks joined together by a motor-driven screw shaft for raising and lowering the platform, there being one group of pivoted jack legs connecting the four corners of the base to the center blocks and a second group of pivoted jack legs connecting the center blocks to the platform, at least two of the diagonally opposed corners of the base having a parallelogram jack leg arrangement, at least the same two corners of the platform having a parallelogram jack leg arrangement to obtain level straight-line stability as the platform is moved, said one group of pivoted jack legs connecting the base to the center blocks being connected to the center blocks at points above the connection of the jack legs of said second group from the platform to the center blocks in order to provide a better torque advantage, the legs of one group being criss-crossed with the legs of the other group to provide rubbing engagement therewith thereby to give stability to the assembly.

5. A precision, parallelogram type lift mechanism as recited in claim 4 wherein the connections of some of the jack legs of the two groups to the center blocks include gear segments with overlapping teeth to provide increased stability to the assembly.

6. A precision, parallelogram type, lift mechanism comprising a base, a parallelogram linkage system, and a platform supported by the linkage system, the linkage system including a plurality of pivoted jack legs and a pair of center blocks, and power driven screw means supported between the blocks for moving the blocks toward and away from each other for effecting the movement of the platform, the jack legs connected to the base being arranged on opposite sides thereof to pivot in parallel vertical planes, the connections of the jack legs to the base being located adjacent the corners of a rectangular area of the base, the jack legs at each corner of the base being inclined to extend across the jack leg at the adjacent corner and on the same side of the base, the upper ends of the jack legs supported from the base are pivotally connected to the top portions of the center blocks, and a second group of jack legs wherein each jack leg is pivotally connected to the lower portion of one of said pair of center blocks and inclined to extend across the jack legs supported on the other of said pair of center blocks and having a pivotal connection at the uppermost end to the platform, the jack legs being in close sliding proximity to each other to improve

the stability of the mechanism during the movement of the platform.

7. A lift mechanism as recited in claim 6 with the addition of gear segments connected to at least some of the jack legs adjacent the connection of the jack legs to the center blocks, the gear segments of the base connected group of jack legs being in mating engagement with the jack legs connected to the platform.

8. A lift mechanism as recited in claim 7 with the addition of counterbalance spring means connected between the two center blocks, which springs are energized as the platform is lowered from its topmost position so as to equalize the load distribution on the motor in both directions of movement of the platform.

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