TELESCOPIC AND ADJUSTABLE BUILDING SUPPORT

Filed July 18, 1945

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

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Application July 18, 1945, Serial No. 605,804

8 Claims. (Cl. 254—98)

The present invention has for its object the provision of a new and improved form of permanent or semi-permanent adjustable support or jack which is primarily designed to be used in existing buildings for raising and supporting sagging floors or roofs. The new and improved form of adjustable support shown and described herein provides for a wide range of initial or rough adjustments to adapt the device for a great variety of ceiling heights, with a final, more accurate adjustment to apply the necessary lifting force to raise the sagging floor or ceiling. It is also an object of the invention to provide a device having these useful properties which can be made from a number of simple and relatively inexpensive mechanical elements.

It is a further object of the invention to devise an adjustable support of this type which can be readily knocked down so that the component parts thereof can be compactly packaged for shipment and sale and can, therefore, be sold over the counter and may be installed by the householder without employing special or skilled labor. The device is relatively light in weight so that it may be easily transported and installed, but is, nevertheless, sufficiently strong to serve the purposes for which it is intended.

It is also an object of the invention to devise a sturdy and efficient device of this character which can be placed in position and operated with a minimum of mechanical skill. The device will not shift, buckle or get out of alignment after it has once been installed and may easily be adjusted from time to time to take care of any later alteration in the floor or ceiling levels.

As an additional advantage, the device is so designed and constructed that it will adequately support normal and proper loads which may be placed upon it, but in the event the force exerted by the screw-jack becomes excessive so as to endanger the whole installation, certain provisions are made which act as a telltale to warn the operator that the load is becoming dangerously excessive. In prior devices of this general character, there is no means for warning the operator who is installing the device that the load is approaching the danger point and the operator may continue to operate the jack until some element of the device breaks, endangering the building or the operator.

It is also an object of the invention to make an adjustable support or column of this type foolproof throughout so that any unskilled person may correctly install and operate the device.

This application is a continuation-in-part of my prior application Serial No. 551,927, filed August 30, 1944, now abandoned, and is designed to cover the basic features contained in the former application as well as certain improvements and refinements made therein to adapt the invention to general commercial distribution.

In the drawings the preferred embodiment of the invention is illustrated as installed, for example, in the cellar of a dwelling for the purpose of supporting the first floor or raising it to correct any sagging which might have occurred during the settling of the house. While the invention is shown and described in detail, it will be appreciated that changes and modifications may be made in specific embodiments of the invention, all within the scope thereof as set forth in the claims appended hereto.

In the drawings:

Fig. 1 is an elevation partly in section showing the device in position;

Fig. 2 is a side elevation of the upper portion of the device;

Fig. 3 is a perspective view of the pin which secures the two tubular members of the support in the proper relation for the approximate height of the ceiling;

Fig. 4 is a detail view showing the manner in which the device acts as a telltale to prevent the application of a destructive load on the support.

The device comprises a main tubular section 1 and a secondary, telescopic tubular section 2. Each of the tubular sections 1 and 2 has a flat outer end, as shown, and the inner end portion of section 2 preferably fits into the inner end portion of section 1 and may be adjusted therein to provide for the initial over-all height of the device so that it may be used in a wide variety of locations. The secondary or inner telescopic section is provided with a plurality of sets of oppositely located, transverse apertures 3, here shown as six sets arranged in staggered relation, through which is passed a transverse pin 5. The outer ends of the pin may be cut away or slotted transversely, as at 6, to a somewhat less depth than the radius of the pin to form shoulders 7 which rest upon the upper edge of the section 1 with the walls of each slot embracing a zone of the tubular wall at the upper end of section 1, as shown in Figs. 1 and 5. These shoulders may be formed by notching the ends of the pin rather than by slotting the pin. These slots or the vertical walls of the notches may be straight or curved to fit the curvature of the section 1. The formations upon the ends of the pin serve to hold the.
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pin in place. If the pin is slotted it also prevents any tendency of the member 1 to spread under the load which may be applied thereon. By adjusting the relative positions of the sections 1 and 2, the house-holder may make the initial adjustment of the length of the support which will be approximately correct for the bell- 
ing height in which 1 is operating. In the drawings the adjustment is shown for the lowest ceiling height to which the device is adapted. The two sections 1 and 2 have just sufficient clearance so that they may be assembled easily and, therefore, will remain in correct alignment.

Fitting closely within the upper or outer end of the section 2 is an elongated sleeve or nut 10. The upper end of which is provided with an enlarged flange 11 which rests upon the upper or outer end of the section 2. It will be noted that the outer surface of the flange 11 is flush with the outer surface of the tubular section 2 and, therefore, smaller than the internal diameter of the tubular section 1. This will insure that the device will not be misassembled by attempting to seat the nut in the end of section 1.

The jack screw 12 is threaded in the nut 10 and is provided near its upper end with an aperture 14 through which a bar 15 may be inserted for turning the screw and applying the force required to expand the overall length of the post for lifting the ceiling. The last threads of the screw may be mutilated, as at 13, to prevent the screw from being freed on the nut.

At the outer ends of the assembled post are located the two sheet metal pressure plates 16 which are identical. Each plate is formed with a centrally located, circular boss 17 stamped therein, the perimeter of the boss at the point 17a being preferably formed as a short, vertical, circular wall of approximately the same diameter as the inner diameter of the section 1, so that when the device is assembled the flat outer edge of the section 1 rests upon the flat surface of the plate about the boss and the tubular end section 1 will fit snugly about the wall 17a and, therefore, will not shift on the lower pressure plate. It will be further noted that the inner diameter of the section 2 is substantially less than the diameter of the wall 17a and, therefore, the section 2 cannot be erroneously assembled in contact with either plate. In the center of each boss is an aperture 20 which is designed to receive a pin 21 formed as an extension of the screw 12. This pin anchors the post at its upper end so that there will be no shifting of the post with respect to the plate at that point. To assist in the rotation of the nut, a washer 25 is located over the pin 20 and lies between the boss 17 and the upper end of the screw 12. The central area of the boss 17 is flat to receive the full thrust of the flat washer 25 and the upper surface of the screw is also flat so that a full bearing is provided at the top of the column.

Ordinarily the area of each plate in contact with the ceiling or floor, respectively, is sufficient to prevent the plates from shifting but to insure that there will be no movement of the device apertures 22 may be provided in the plates so that securing means, indicated at 23, may be driven into the ceiling joist through the upper plate. If the floor permits it, the lower plate may also be secured in a like manner.

It will be seen that a very substantial and effective construction has been devised which will not buckle under extreme loads. The telescopic tubular members provide a rigid construction and the nut 10 is elongated as shown so that it will not tend to get out of alignment. The assembly cannot shift or cock at either end with respect to the pressure plates. A unit of the type shown has a wide range of adaptability and it is not necessary to provide extra pieces or attachments to take care of a great variety of ceiling heights in which the device is operating. The device is simple and easily assembled, and while it is preferred to assemble it with the screw at the top of the device, the entire telescopic column may be reversed if for any reason the screw 12 is not readily accessible at or near the ceiling.

The device is especially designed so that while it is capable of successfully supporting any load which may normally be placed upon it, the operator is advised if the load has become too great for safety. The screw-jack may be used to exert a tremendous pressure, but there should be some means which will show the operator that the pressure is becoming too great so that it endangers the entire structure. For this purpose the pin 8 is made so that the resistance to shear between the two sections 1 and 2 is considerably greater than the resistance of the material of the tubular sections to crushing. As a consequence, as the force exerted by the screw begins to exceed a safe amount, the metal stock in either the section 1 or the section 2, or both, will begin to squash out as the pin starts to embed itself in the edge of either or both sections. This action is illustrated in Fig. 5 where a condition is shown which may be considered as illustrating the effect of an extremely aggravated load. The flattened and distorted metal in the sections 1 and 2 is indicated at x and y, respectively. Normally the dangerous excess load will have made itself apparent to the operator even before such an exaggerated condition will have occurred. As soon as there is evidence of yielding of the metal about the pin, the operator will know that a danger point is imminent and will proceed with caution or cease to exert any further load on the device.

This in an important feature of the improved support for it prevents the operator from blindly exerting so great a pressure upon the device as to endanger the building or himself.

While it is not intended in any respect to limit the invention to the dimensions and details here set forth, it has been found that a cold-rolled steel pin of 3/8 inch diameter with slots 3/8 inch deep and by making the section 1 of a twelve gauge (.109") stock and the section 2 of an eleven gauge (.120") stock and both of a 1010 SAE standard steel, the stock about the pin 5 will start to crush at between 16,500 and 17,500 lbs. or more. This is all of the load which a column of this type should be called upon to bear. By increasing the dimensions of the pin or by using a heavier or more rigid stock for the sections 1 and 2, the critical load point may be increased, but if this is carried too far, other elements may be in danger of fracturing under load, and it is better to provide for a tell-tale or weak spot, such as the crushing of the tubular stock, which can occur without endangering the entire unit.

It will be seen that a safe and adequate building support has been devised that cannot be misused and that is foolproof. The forces which may be exerted by a device of this character are tremendous and unless the device is foolproof and gives out a warning that the load thereon is becoming dangerously high, such a device is apt to cause disastrous results when used by an unskilled operator.
While the device is mainly used for shoring up floors or ceiling of old buildings, houses and the like, it may have a wider utility. The tubular sections are shown as circular in form, but may be made in any cross-section.

What is claimed is:

1. A device for the uses and purposes set forth, comprising two tubular members of uniform cross section throughout their length adapted to fit in telescopic relation, the smaller of said tubular members being provided with transversely arranged holes, a pin passing through said holes, said pin having shoulders adjacent its ends adapted to rest on the edge of the larger tubular member, a nut seated within the outer end of the smaller tubular member, a screw threaded in the nut, the screw having an outer flattened area, and pressure plates at the ends of the device each provided with a flattened area to bear against the flattened area on the screw and also with means to interlock either with the screw or with the larger tubular member.

2. An adjustable building support comprising two tubular members having flat outer ends and telescoping inner end portions, the smaller of said tubular members being provided with transversely arranged holes, a pin passing through said holes, said pin having slots formed transversely thereof adjacent its ends providing a shoulder at the inner end of each slot, said shoulders resting on the edge of the inner end of the larger tubular member, a nut seated within the outer end of the smaller tubular member, a screw threaded in the nut, a flat bearing surface on the outer end of the screw, a reduced pin extension extending beyond said flat bearing surface on the outer end of the screw, a reduced pin extension extending beyond said flat bearing surface on the outer end of the screw, a pressure plate provided with an aperture to receive said pin extension and having a flat area surrounding said aperture, flat washer means interposed between said flat bearing surface and said flat area, and a second pressure plate having a flat surface to bear against the flat outer end edge of the larger tubular member.

3. An adjustable building support comprising two tubular members having flat outer ends and telescoping inner end portions, the smaller of said tubular members being provided with transversely arranged holes, a pin passing through said holes, said pin having slots formed transversely thereof adjacent its ends providing a shoulder at the inner end of each slot, said shoulders resting on the edge of the inner end of the larger tubular member, the slot walls embracing portions of the tubular wall at the inner end of the larger tubular member, a nut seated within the outer end of one of the tubular members, a screw threaded in the nut, a flat bearing surface on the outer end of the screw, a reduced pin extension extending beyond said flat bearing surface on the outer end of the screw, a pressure plate provided with an aperture to receive said pin extension and having a flat area surrounding said aperture, flat washer means interposed between said flat bearing surface and said flat area, and a second pressure plate having a flat surface to bear against the flat outer end edge of the larger tubular member.

5. An adjustable building support comprising two tubular members having flat outer ends and telescoping inner end portions, a plurality of holes in one of the tubes in axially spaced relation, a pin adapted to be received in any one of said holes to be engaged with the end of the other tube, said pin being provided with a pair of flat-bottomed slots to receive the end of said other tube and to hold it in place when under load, a nut having a reduced portion adapted to fit within the outer tubular end of one of said tubes and having an enlarged flange to bear against the flat outer end of said one tubular member, a screw in the nut, a flat bearing surface on the outer end of the screw, a reduced pin extension extending beyond said flat bearing surface on the outer end of the screw, a pressure plate provided with an aperture to receive said pin extension and having a flat area surrounding said aperture to bear against said flat bearing surface, and a second pressure plate having a flat surface to bear against the flat outer end edge of the other tube.

6. A floor jack including a pair of telescoping tubes, a plurality of axially spaced holes in one tube, a pin adapted to be received in a selected hole and to engage with the end of the other tube, said pin having a pair of curved flat-bottomed slots cut into its ends and adapted to receive the said end of the last-mentioned tube, and screw means associated with one of the telescoping tubes and adapted to increase the length thereof.

7. An adjustable vertical post comprising two tubular members arranged in telescopic relation, one of the members being provided with transversely arranged holes, a pin passing through said holes and having shoulders resting on the end of the other tubular member, a screw and nut associated with one of the tubular members, and said pin having a predetermined shearing resistance greater than the force required to crush the stock of one of the tubular members adjacent to the pin.

8. An adjustable vertical post comprising two tubular members arranged in telescopic relation, one of the members being provided with transversely arranged holes, a pin passing through said holes and having shoulders resting on the end of the other tubular member, a screw and nut associated with one of the tubular members, said screw having an outer flattened area, and a pressure plate having a flattened area bearing against the flattened area on the screw.

STERLING W. ALDERFER.

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