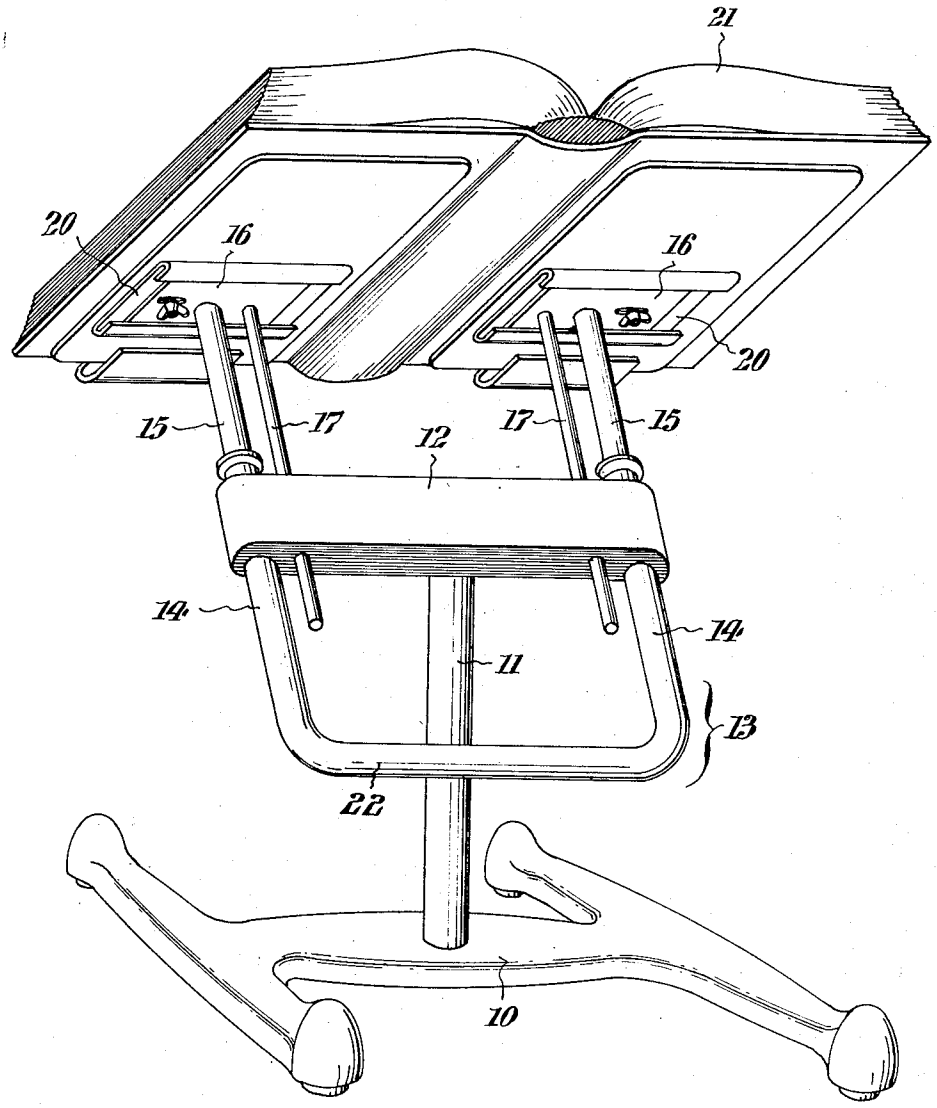
Nov. 20, 1956 S. A. HOOKER 2,770,914

HYDRAULIC LEVELING DEVICE

Filed Nov. 2, 1954 2 Sheets-Sheet 1

FIG. 1



INVENTOR:
Samuel A. Hooker,
BY Paul & Paul

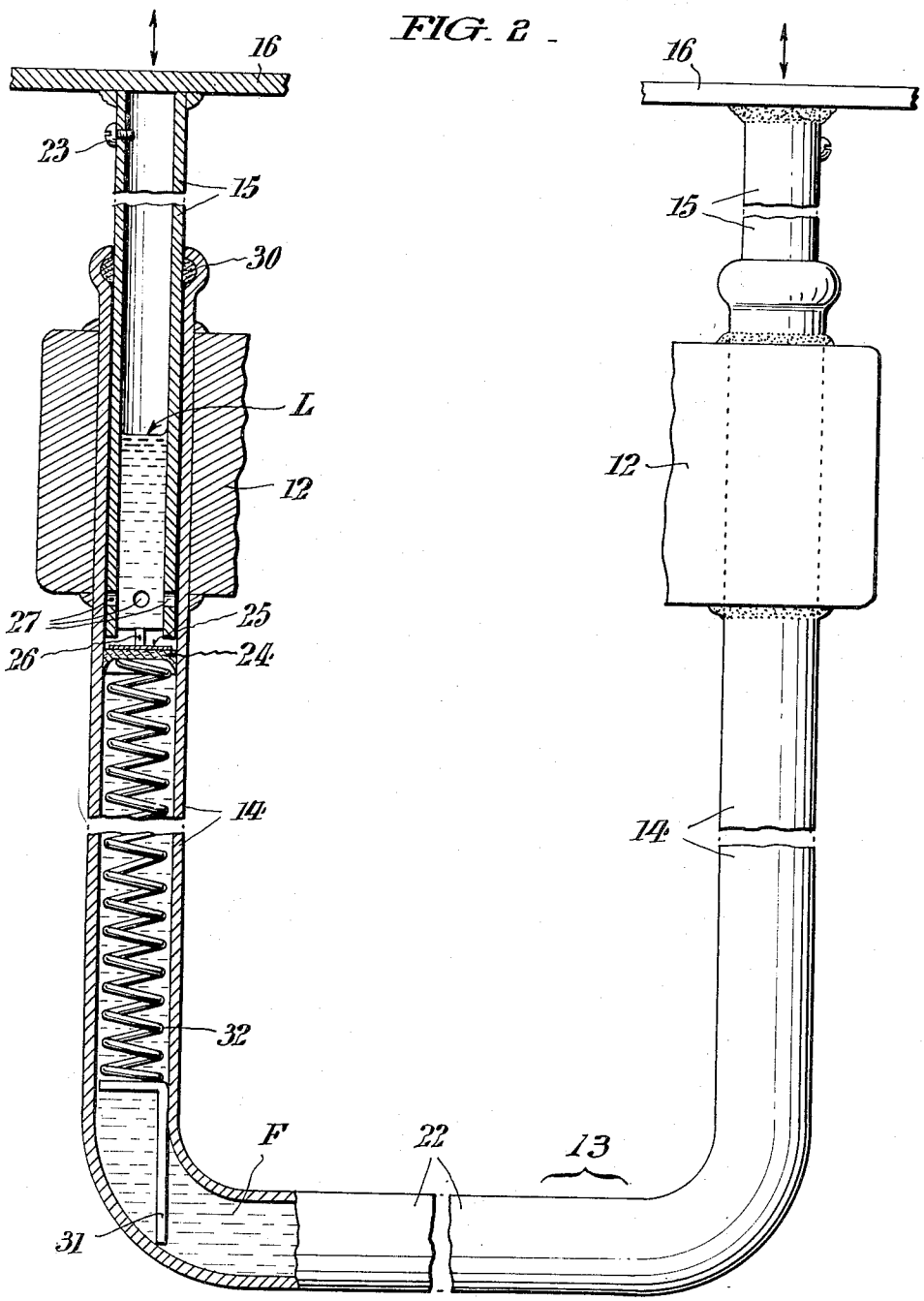
ATTORNEYS.

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Filed Nov. 2, 1954 2 Sheets-Sheet 2

FIG. 2



INVENTOR:
Samuel A. Hooker,
BY Paul & Paul

ATTORNEYS.

United States Patent Office 2,770,914 Patented Nov. 20, 1956

2,770,914

HYDRAULIC LEVELING DEVICE

Samuel Arthur Hooker, Martinsville, Va.

Application November 2, 1954, Serial No. 466,341

3 Claims. (Cl. 45—86)

This invention relates to a hydraulic leveling device and more specifically concerns a book stand having a novel leveling means incorporated therein.

Self-leveling book stands have been manufactured and sold in substantial quantities, as they are particularly adaptable for holding relatively thick and heavy books such as encyclopedias, unabridged dictionaries and the like. It has been recognized that, when a thick book is placed on a level surface and opened the pages are not flat. This makes the reading surface difficult to read. Accordingly it has been highly advantageous to provide a structure whereby the pages are flat wherever the book may be opened. One heavy duty book stand which has met with considerable success has been manufactured and sold under U. S. Patents Nos. 2,260,694 and 2,260,695.

It is an object of this invention to provide a book stand which embodies structural and functional advantages over the book stands of the aforementioned patents. Still another object of this invention is to provide a novel and highly efficient hydraulic leveling mechanism. Other objects and advantages of this invention will appear in further detail hereinafter and in the drawings whereof:

Fig. 1 represents a view in perspective illustrating a book stand embodying features of this invention; and

Fig. 2 represents a vertical elevation of the hydraulic leveling mechanism of the book stand, portions of the hydraulic leveling mechanism being broken away and shown in section in order more particularly to illustrate important details.

Turning now to the specific embodiment of the invention selected for illustration in the drawings, the number 10 designates a base to which a vertical post **11** is secured. Fixed on top of the post **11** is a cross brace **12** which extends upwardly at an acute angle to the vertical. A U-tube **13** has a pair of parallel spaced apart legs **14** the upper ends of which extend through the cross brace **12** and are affixed thereto. Telescopically received in the upper ends of legs **14** are a pair of piston members **15** having tables **16** fixed to their upper ends. Guide rods **17** are fixed to the table **16** and extend downwardly parallel to the legs **14** through guide openings formed in the cross brace **12**. Adjustable plates **20** are mounted on the tables **16** to support the covers of a book **21**.

Turning now to Fig. 2 of the drawings, it will be appreciated that the legs **14** are hollow tubes, and that the U-tube **13** includes a hollow base **22** which communicates with both legs **14**. Hydraulic fluid F is disposed in the legs **14** and in the base **22**.

Piston members **15** are also hollow tubes. At their upper ends they are seal welded to the plate **16**. Air bleed screws **23** are threaded through the piston members **15** adjacent their upper ends. Depending from the lower ends of piston members **15** are pistons **24** which may consist of leather, rubber or the like. Pistons **24** have metal back-up plates **25** which are fixed to the piston members **15** by rigid straps **26**. Each tube **15** is provided with a vent **27** for the trapped oil.

The normal oil level inside the piston member **15** is indicated by the letter L. The space inside the member **15**, above the level L, is filled with air or some other readily compressible fluid. The number **30** designates a conventional seal between the U-tube leg **14** and the piston **15**.

A stop brace **31** is welded or otherwise affixed to the bottom of each leg **14** at its intersection with the base **22**. The stop brace **31** is preferably an angle iron having arms at right angles to one another. A helical spring **32** extends axially along each leg **14** between the stop brace **31** and the lower face of piston **24**. Spring **32** is normally under compression.

From the foregoing description the operation of the hydraulic leveling mechanism will be apparent. Referring to Fig. 2 for example, the opposed springs **32** are each acting upwardly upon the pistons **15**, thereby counterbalancing the weight of the book or other object supported by the tables **16**. When an unbalanced force is exerted downwardly on the left hand table **16** as viewed in Fig. 2, the force is resisted by spring **32**, which yields downwardly and is further compressed. With the movement of piston **24** downwardly hydraulic fluid is pumped out of the left hand leg **14** into the right hand leg **14**, thereby tending to raise the right hand table **16**. In fact, the right hand table **16** will be raised to substantially the same extent as the left hand table **16** is lowered.

As the left hand table **16** moves downwardly, the corresponding spring **32** exerts a continuously increasing force. Concurrently, with the movement of right hand table **16** upwardly, its spring is longitudinally extended, and exerts a continuously decreasing upwardly directed force. Eventually the downwardly exerted unbalanced forces are equalized or balanced by the unbalanced upwardly directed forces exerted by the springs, and the relative movement of the tables stops. In the resulting static condition, oil from the right hand leg **14** tends to leak back to the left hand leg **14**, seeking its own level. As the oil leaks past the piston oil seals **24** its flow is cushioned and resisted by the compression of the air trapped in the upper portion of the left hand piston member **15**. It will be appreciated that the extent of such cushioning action may be varied by providing various means permitting fluid leakage past the piston oil seals **24**, such as slots, for example. It will be appreciated that, when the air in left hand piston member **15** is compressed the air in right hand piston member **15** is expanded, thereby providing further cushioning action. As a result of the coaction of the various members embodied in the legs **14**, a positive yet smooth and cushioned movement of the tables **16** is obtained.

The automatic leveling device of this invention has utility in connection with bookstands and with other types as well. In fact, it is not inconceivable that it has utility in automobiles, trunks, etc. and in balancing floors, platforms and the like.

It will be appreciated that the device may be modified in a variety of other ways. For example, equivalent mechanisms may be substituted for those shown in the drawings provided they function in a similar manner to accomplish a similar result, parts may be reversed, and certain features of the invention may be used independently of other features, all within the spirit and scope of the invention as defined in the appended claims.

Having thus described my invention, I claim:

1. A hydraulic leveling device comprising a base, a pair of hollow legs extending upwardly from said base, said legs containing a hydraulic fluid, a pair of pistons extending telescopically into the tops of said legs, said pistons being hollow providing spaces therein, said spaces containing a compressible fluid, platforms fixed on top of the pistons, hydraulic means connecting said legs to

one another below said pistons, and compression springs anchored adjacent the bottoms of said legs extending upwardly inside said legs bearing on the bottoms of said pistons, whereby a movement of one platform in a predetermined direction causes a corresponding movement of the other platform in the opposite direction.

2. A hydraulic leveling device comprising a hollow U-tube containing hydraulic fluid, hollow sleeves slidably reciprocable in the legs of the U-tube, tables sealing the tops of said sleeves, pistons on the bottoms of said sleeves in said fluid, and compression springs anchored adjacent the bottoms of the legs of the U extending upwardly inside said legs bearing on the bottoms of said pistons.

3. A book stand comprising a support having legs, a hollow U-tube fixed to said legs extending upwardly from said support at an acute angle to the vertical, said U-tube having a pair of substantially parallel legs containing hydraulic fluid, piston members slidably reciprocable in said legs, said piston members communicating with each other through said hydraulic fluid, platforms fixed on top of each piston member, each said platform being constructed to support a portion of a book, a cross brace extending between the legs of the U-tube, and guide means fixed to said platforms and extending through said cross brace.

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