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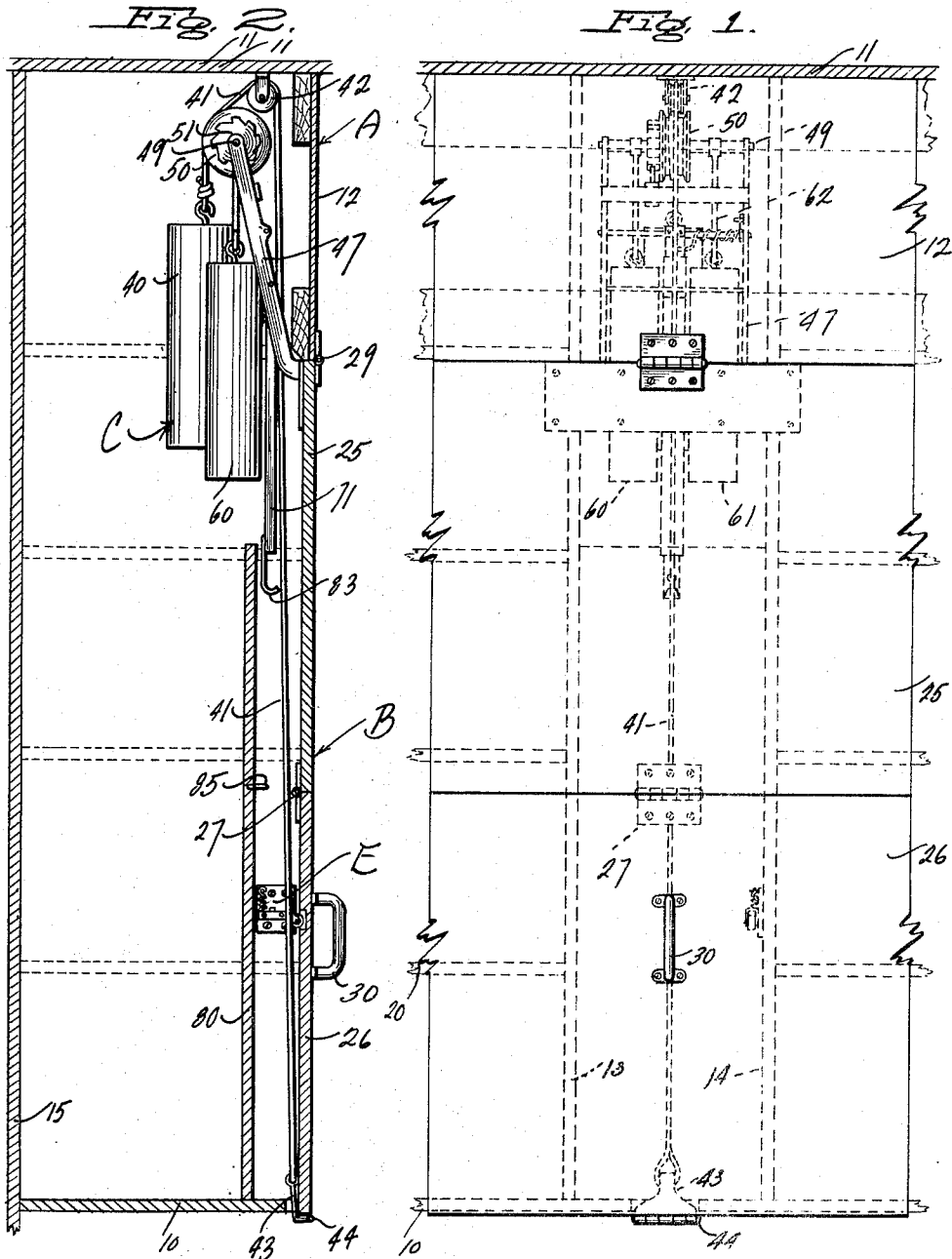
D. G. TAYLOR

2,523,929

COUNTERBALANCED CLOSURE

Filed Jan. 30, 1946

3 Sheets-Sheet 1



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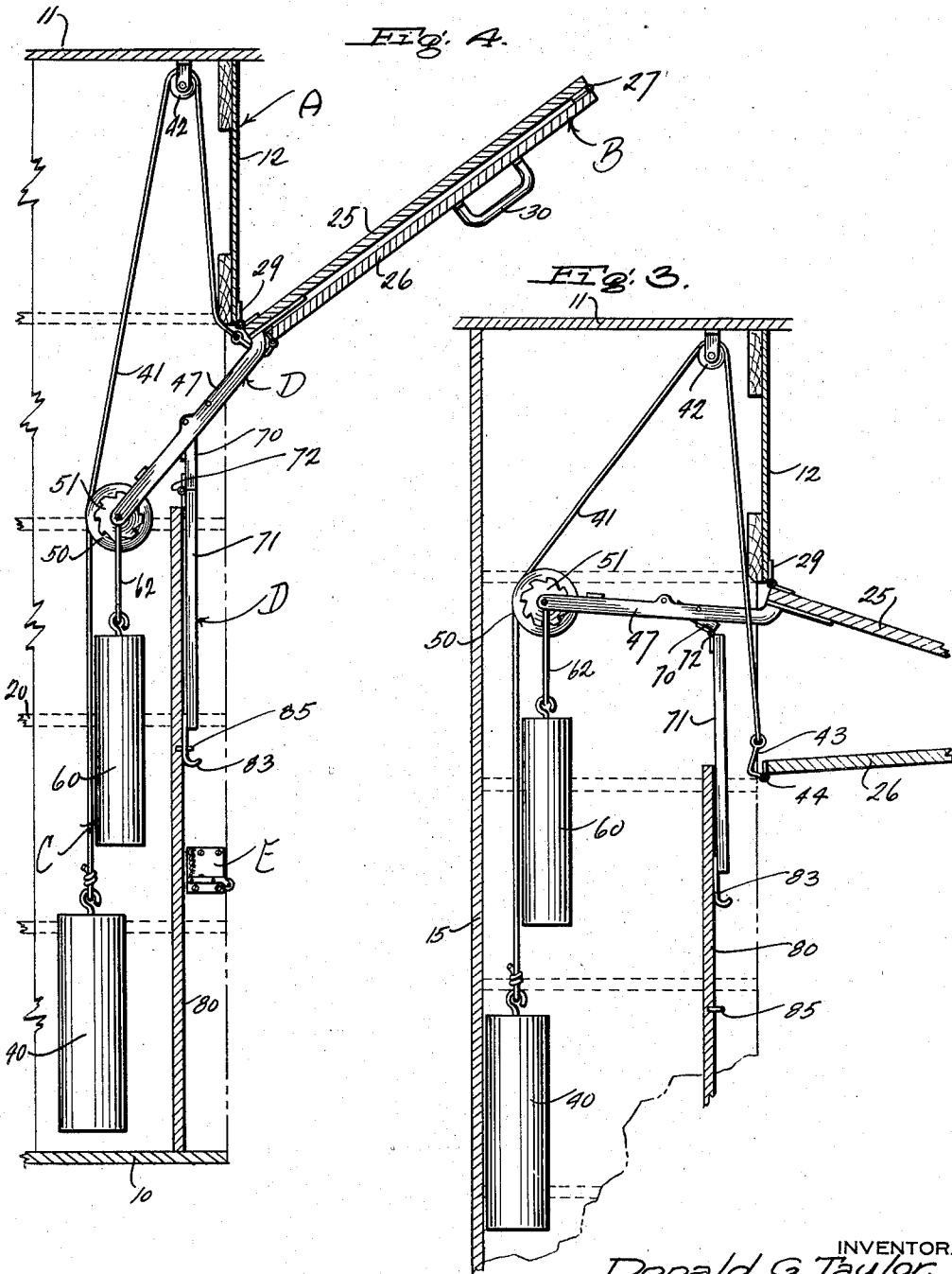
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3 Sheets-Sheet 2



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FIG. 5.

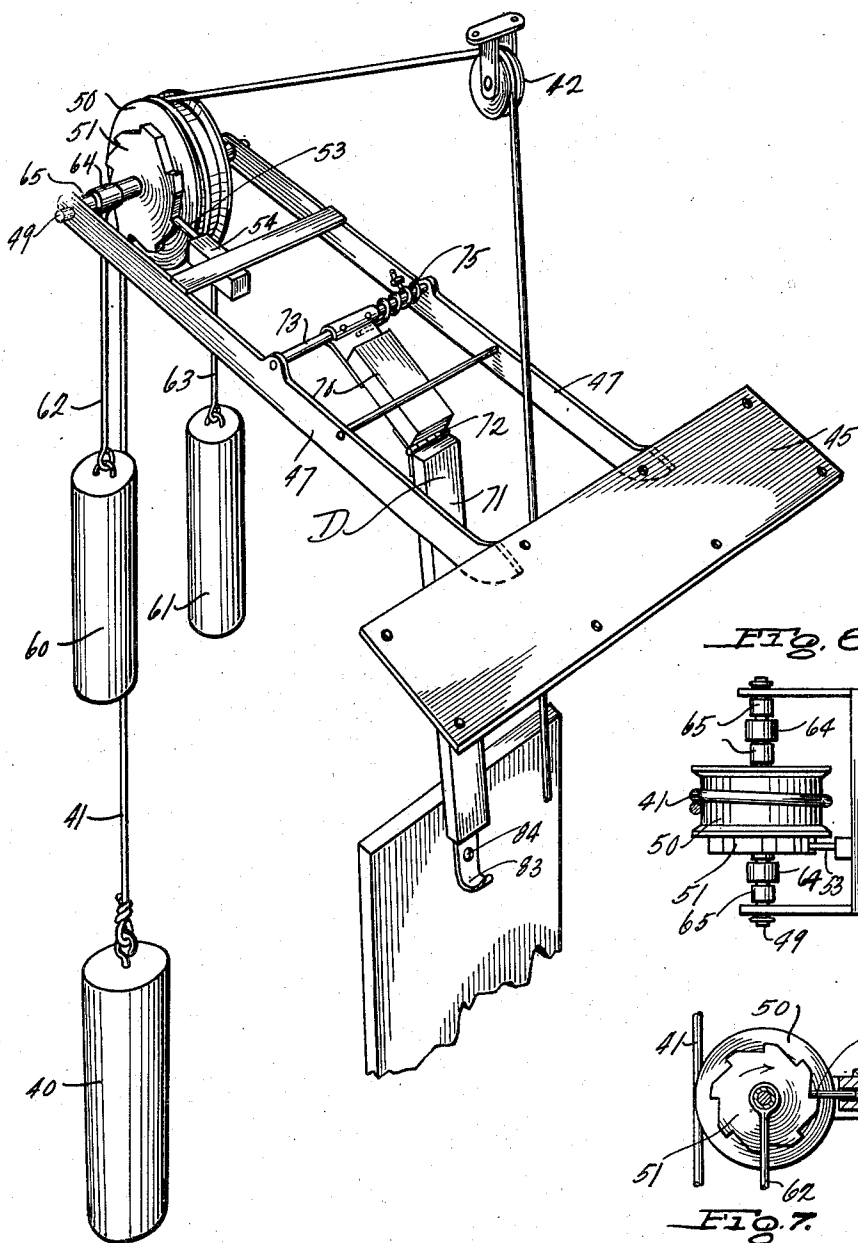


FIG. 6.

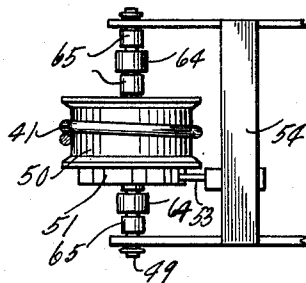
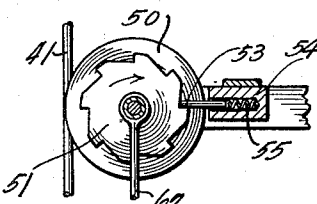


FIG. 7.



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UNITED STATES PATENT OFFICE

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COUNTER-BALANCED CLOSURE

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4 Claims. (Cl. 160—190)

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This invention relates to improvements in counterbalanced closures.

The primary object of this invention is the provision of a counterbalanced cabinet construction which embodies means arranged in a compact and efficient relationship for opening and closing a plurality of horizontally hinged closure sections.

Present day side hinged and sliding doors for cabinets have decided disadvantages in that the doors are positioned where they will provide interference to easy access or are impractical in that they prevent full access to the interior of the cabinet. It is therefore a purpose of this invention to provide an efficient horizontally hinged closure construction for cabinets such as are used in kitchens, pantries, laboratories, workshops and the like, of a nature which will permit the closure sections to be easily opened and closed so that continuous access may be had to the entire interior of the cabinet.

A further object of this invention is the provision of a counterbalanced closure structure wherein the closure comprises a plurality of sections mounted upon horizontal pivot axes in which the counterbalancing mechanism includes means offering a retarding action to the initial opening of the closure sections, and which retarding action is released during a closing movement of the closure sections.

Other objects and advantages of this invention will be apparent from the following detailed description.

In the accompanying drawings, forming a part of this specification, and wherein similar reference characters designate corresponding parts throughout the several views—

Figure 1 is a fragmentary front elevation of a cabinet structure showing the closure construction and in dotted lines details of the counterbalancing mechanism.

Figure 2 is a vertical cross sectional view taken through the closure construction and its counterbalancing mechanism.

Figure 3 is a fragmentary sectional view similar to Figure 2 but with the closure sections in partially open position.

Figure 4 is a cross sectional view similar to Figure 2 but with the closure sections in fully open position.

Figure 5 is a perspective view showing the arrangement of the counterbalancing details.

Figure 6 is a fragmentary view showing a pulley construction associated as a part of the counterbalancing mechanism.

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Figure 7 is a side elevation, partly in section, showing a ratchet mechanism associated with the pulley of Figure 6.

In the accompanying drawings, forming a part of this specification, and wherein for the purpose of illustration is shown only a preferred embodiment of the invention, the letter A may generally designate a framework or cabinet construction having a closure B associated in horizontally hinged relation therewith; the latter having improved counterbalancing mechanism C and an arrangement D to facilitate the operation and positioning of the closure construction B.

It will be appreciated that the framework of the cabinet A may vary widely in arrangement and design. In the example shown the same consists of a bottom wall 10; top wall 11 and a vertically positioned upper panel 12 just below the top wall 11. A compartment is provided for receiving details of the counterbalancing mechanism C consisting of relatively spaced side walls 13 and 14 and a rear wall 15 defining a chamber which preferably extends from the top to the bottom of the cabinet but, of course, is very shallow in depth and narrow as shown in the drawings. The interior of the cabinet may have shelving indicated at 20 in any desired arrangement. This arrangement extends to the right and left of the walls 13 and 14 and may continue behind the rear wall 15, and it is within the contemplation of this invention to provide a closure structure with counterbalancing mechanisms of similar nature at each side of a cabinet, and in which case there will be no intermediate counterbalancing arrangement.

The closure structure B preferably consists of upper and lower sections 25 and 26 hingedly connected upon a horizontal pivot 27. The top of the upper section 25 is hingedly connected at 29 upon a horizontal axis, and upon the exterior of the closure 26 there is provided a hand hold 30. These closure sections, of course, extend from end to end of the cabinet arrangement and across the front of the compartment which houses the counterbalancing details.

Referring to the counterbalancing mechanism C I provide a counterbalancing weight 40 secured to a cable or cord 41 which extends upwardly from the weight 40 and is trained over a pulley 42 secured upon the top wall 11 of the cabinet within the compartment provided for the counterbalancing mechanism; the cable extending downwardly and being secured at its lower end to the upper end of an L-shaped hinge or member 43 which is pivotally connected at 44 upon the lower

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margin of the closure section 26. This constitutes a counterbalancing mechanism for the lower closure section 26, except as modified by its association with the details to be hereinafter described.

Secured upon the inner upper margin of the upper closure section 25 is an inwardly extending bracket arm arrangement consisting of an attaching plate 45 which is secured to the inside of the upper closure section 25. It has fixedly and rigidly connected therewith a pair of inwardly extending parallel arms 47 which at their ends remote from the attaching plate 45 rotatably support a shaft 49 upon which a pulley 50 is mounted. This is a grooved pulley and it is adapted to have the cable 41 which is connected to the lower closure section 26 wound about the pulley 50 for one or more turns, as shown in Figures 5 and 6 of the drawings.

The pulley 50 is provided with a ratchet wheel 51 secured thereto, the teeth of which are positioned to cooperate with a detent or pawl 53 under such circumstances that the pulley can only rotate clockwise. This detent 53 is mounted in a horizontal brace 54 connecting the arms 47 and it is spring urged at 55 into engagement with the teeth of the ratchet wheel 51.

The counterbalancing arrangement for the upper closure section 25 consists of counterbalancing weights 60 and 61 supported by means of rods 62 and 63 upon the shaft 49. The upper ends of these rods 62 and 63 are suitably provided with sleeves 64 for this purpose and the sleeves are retained in properly spaced relation by means of spacing sleeves 65 located upon the shaft 49.

The dead load provided by the weights 40, 60 and 61 is slightly less than that required to completely counterbalance or open the closure arrangement B. It will be noted that the pulley 42 is mounted in the cabinet so that when the closure sections are shut the cable 41 will be just slightly off a vertical position within the cabinet sections provided therefor. In this position the bracket arms 47, as shown in Figure 2, are inclined upwardly and inwardly and the said bracket arrangement holds the counterweight 40 slightly between and also to the rear of the other weights 60 and 61. In this position of parts it is obvious that, since the cable or cord 41 is trained for one complete turn, at least, around the pulley 50, a retarding action will be imposed upon the initial opening of the closure. Assuming the parts to be in the position of Figure 2, the operator grasping the handle 30 imposes a lifting action which will swing the closure sections upon their pivot 27 and also the pivot 29. Force is imposed by the operator sufficient to overcome friction to relative sliding of the cable upon the circumference of the pulley 50, since it will be noted that from the position shown in Figure 2 to the position shown in Figure 3, a sliding action of the cable upon the pulley circumference will be necessary due to the fact that the distance between the cable connection of the cable upon the closure section 26 and the pulley 50 is decreased; the counterweight 40, of course, holding the cable taut. When the position shown in Figure 3 is reached the relative frictional sliding of the cable upon the pulley circumference will cease, because incidental to the provision of the bracket arm arrangement the length of the cable between the pulley 50 at this point and the hinge 43, measured around the pulley 42, remains sub-

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stantially constant until the full open position shown in Figure 4 is reached. To swing the closure fully opened from position shown in Figure 3, it will be necessary to pull downwardly upon a section 71 of means to hold the closure in fully opened position. This arrangement consists of upper and lower rigid sections 70 and 71 hingedly connected at 72. The section 70 is shorter and it is pivotally mounted upon a rod 73 mounted upon the bracket arms 47 intermediate their ends. A spiral spring 75 connected at one end with the section 70 and at its opposite end with the adjacent bracket arm normally urges the section 70 forwardly, as shown in Figures 3 and 5 of the drawings.

A partition wall 80 is placed in the counterbalancing weight compartment between the walls 13 and 14 inwardly a short distance from the plane of the closed door sections 25 and 26 and in the space between this partition and the marginal edges of the framework against which the closure sections about operates the depending pull section 71. The latter at its lower end is provided with an apertured handle engaging member or hook 83 having an opening 84 therein which is adapted to engage over a retaining pin 85 when the closure sections are in fully open position in order to hold and lock said closure sections in open position against closing. When it is desired to shut the closure sections, it is merely necessary for the operator to grasp the hook 83 or section 71 and pull the same forwardly to release hook 83 from pin 85. Under its own weight the closure will then move to fully closed position. During this action it will be noted that very little retarding action will be imposed to the closure action as a result of the winding of the cable 41 upon the pulley 50, because the pulley will rotate inasmuch as its ratchet will rotate clockwise notwithstanding the detent 53, as is quite obvious from Figure 7.

If desired a latch E may be provided to hold the closure sections in shut position.

It will be apparent from the foregoing that an improved counterbalancing arrangement for cabinet closures has been provided which is of such nature as to facilitate the opening and closing action and position the closure in an out of the way position. Of course this is all of the nature to facilitate access to the contents of the cabinet and save time, as well as inconvenience.

The fact that the sections 70 and 71 are hinged enables the section 71 to be substantially vertically positioned at all times and in this respect the spring 75 cooperates. Of course in lieu of pull sections such as shown I may employ a single cord secured to the shaft 73 for engagement with the pin 85.

It will be apparent, of course, that the hinge 43 is of considerable importance since it positions the cable 41 where it will not greatly interfere with the complete opening action of the closure sections.

Various changes in the shape, size and arrangement of parts may be made to the form of invention herein shown and described, without departing from the spirit of the invention or the scope of the following claims.

I claim:

1. In a counterbalancing cabinet closure construction the combination of a cabinet, a closure construction for the cabinet comprising a plurality of horizontally hinged sections, the uppermost of which is horizontally hinged upon the

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cabinet, a cable connected to the lower portion of the lowermost of the closure sections, a pulley rotatably mounted in the cabinet above the hinged connection of the uppermost section of the closure construction to said cabinet over which said cable is trained, a counterweight upon the opposite end of the cable, and means connected with the uppermost section of the closure construction having the cable between the pulley and the counterweight trained thereupon for imposing a retarding action to the opening movement of the closure construction, said means comprising a pulley and ratchet means normally preventing rotation of the pulley during an opening movement of said closure construction.

2. In a closure construction for cabinets and the like the combination of a framework, a closure construction comprising a plurality of horizontally hinged closure sections, the uppermost of which is horizontally hinged to the framework, a bracket arm construction connected with the top marginal portion of the uppermost of the closure sections and extending inwardly and beyond the hinged connection of the uppermost closure section upon the framework, a pulley upon the end portion of the bracket arm construction remote from its closure connection, ratchet means normally preventing rotation of the pulley in one direction, a cable connected with the lower marginal portion of the lowermost of the closure sections, a pulley mounted upon the framework above the hinged connection of the closure construction upon the framework, said cable being trained over said last-named pulley, a counterweight upon the lower end of the cable, said cable between the counterweight and said last named pulley being wound for at least one turn around the pulley of said bracket arm construction.

3. In a closure construction for cabinets and the like the combination of a framework, a closure construction comprising a plurality of horizontally hinged closure sections, the uppermost of which is horizontally hinged to the framework, a bracket arm construction connected with the top marginal portion of the uppermost of the closure sections and extending inwardly and beyond the hinged connection of the uppermost closure section upon the framework, a pulley upon the end portion of the bracket arm construction remote from its closure connection, ratchet means normally preventing rotation of the pulley in one direction only, a cable connected with the lower

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marginal portion of the lowermost of the closure sections, a pulley mounted upon the framework above the hinged connection of the closure construction upon the framework, said cable being trained over said last-named pulley, a counterweight upon the lower end of the cable, said cable between the counterweight and the last-named pulley being wound for at least one turn around the pulley of said bracket arm construction, and counterweight means suspended from the bracket arm construction remote from its connection with respect to the closure construction.

4. In a counterbalanced closure construction for cabinets and the like the combination of a framework, a closure construction comprising uppermost and lowermost closure sections, a horizontal hinged connection between the closure sections, a hinged connection between said uppermost section and the framework, a cable connected with the lower marginal portion of the lowermost closure section extending upwardly to a point above the hinged connection of the uppermost section of the closure construction with the framework, pulley means at the said point above the hinging of the closure construction upon said framework over which said cable is trained, a counterweight upon the end of the cable remote from its connection with said lowermost closure section, a bracket arm construction connected with the upper marginal portion of the uppermost closure section extending beyond the upper marginal portion of the upper closure section, a shaft carried by said bracket arm construction remote from the connection of said bracket arm construction with said upper marginal portion a pulley upon the shaft, over which last-named pulley the said cable is also trained with at least one turn around the circumference thereof and counterweight suspended directly from said shaft.

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