

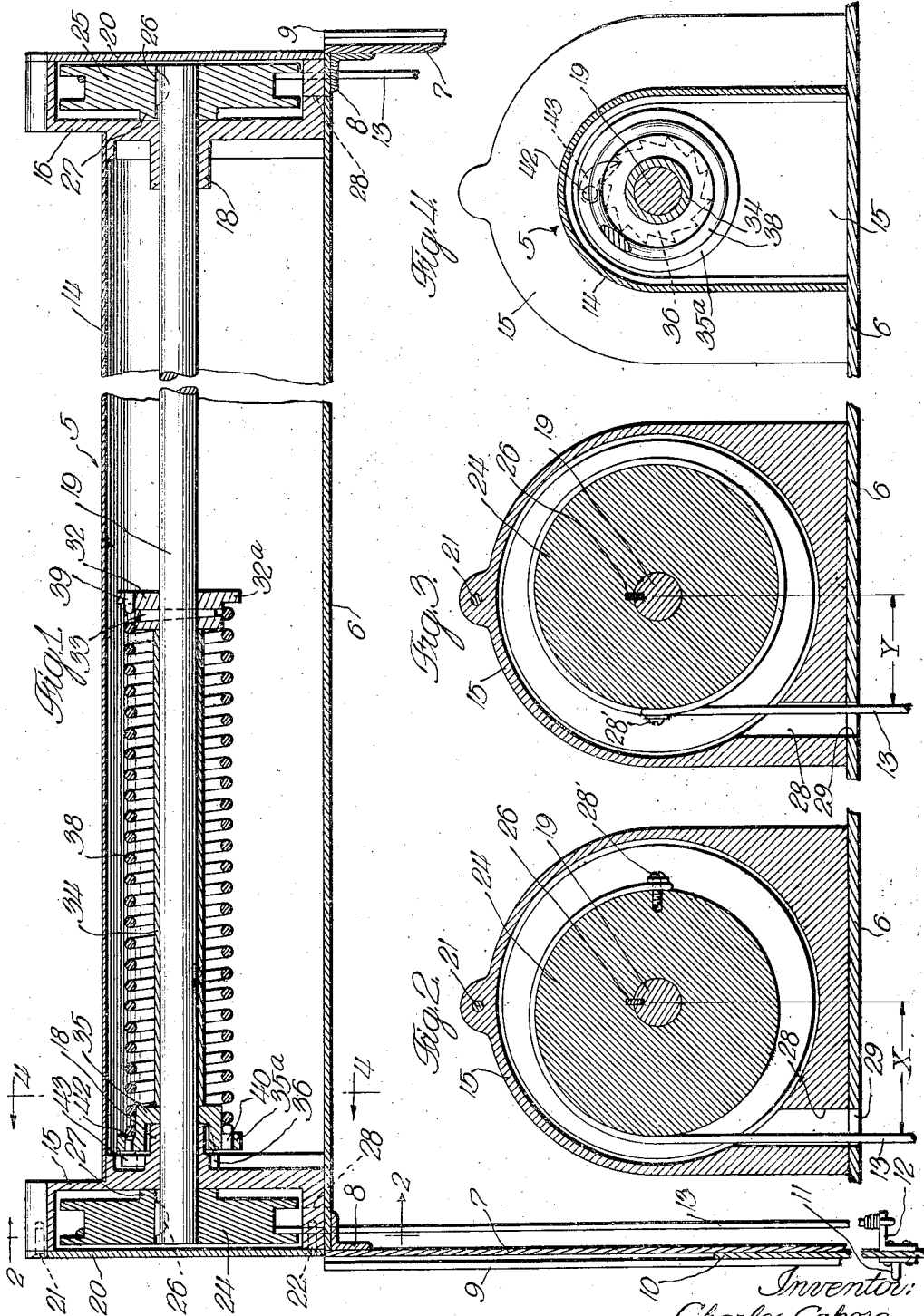
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LOAD OPERATING MEANS

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1,975,633

LOAD OPERATING MEANS

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6 Claims. (Cl. 242—107)

This invention relates to load operating means, and is more specifically directed to means for simultaneously raising and lowering a plurality of loads, such as sliding doors or the like.

The present invention is a division of my co-pending application, Serial No. 604,423, filed April 11, 1932, and is directed particularly to the load raising and lowering mechanism disclosed therein.

In the preferred embodiment of the present invention, I have disclosed a load operating mechanism comprising eccentrically mounted pulleys or sheaves disposed upon a common shaft. This shaft is maintained under any desired tension by means of a spring coiled about the shaft and having an adjustable locking connection with a stationary part of the shaft housing, whereby any predetermined spring tension may be imparted to the shaft by rotating the adjustable connection about the shaft. Connected to the pulleys are suitable load operating cables, which may be secured to any desired loads, such as sliding doors, to simultaneously raise and lower a plurality of loads.

The eccentrically mounted pulleys are so disposed that when the loads are in lowered position, the weight of the loads and the length of the effective lever arms of the pulleys are such as to prevent raising of the loads by the spring. However, when the loads are in raised position, the pulleys have been rotated to an extent such that the weight of the loads and the length of the effective lever arms of the pulleys are insufficient to overcome the tension of the spring and lower the loads. The loads are maintained in either raised or lowered position automatically, and no locking means for positioning the loads in either of these positions is required.

The operating mechanism is constructed as an enclosed unit, and may be positioned to operate parallelly spaced loads, or may be angled in position to operate loads extending in an angular relation to each other, without any modification of the load operating structure itself.

The invention, in its broader aspects, is also applicable to the operation of a single load, or a plurality of loads, as desired.

Other objects and advantages of the present invention will appear more fully from the following detailed description, which, taken in connection with the accompanying drawing, will disclose to those skilled in the art the particular construction and operation of a preferred embodiment of my invention.

In the drawing:

Figure 1 is a sectional elevational view of the load operating means of the present invention as applied to the raising and lowering of a pair of spaced sliding doors;

Figure 2 is a sectional view taken substantially along the line 2—2 of Figure 1;

Figure 3 is a sectional view similar to Figure 2 with the pulley rotated to a position corresponding to the raised position of the door; and

Figure 4 is a sectional view taken substantially on the line 4—4 of Figure 1, showing the adjustable locking connection for the spring tensioning means.

Referring now in more detail to the drawing, the load operating means is preferably enclosed within a single housing 5, which is suitably supported upon the top or supporting wall 6 of any suitable structure, such as a dishwashing machine or the like, having the spaced side walls 7 supporting the top wall 6 by means of a plurality of angle bracket members 8. The side walls 7 are provided with suitable guide members 9, which form guideways for a sliding load, such as the door 10, which is adapted to have vertical movement within the guide 5. The door 10 is provided with a handle member 11, which, upon the inner surface of the door, is provided with an angle member 12 having an opening therein receiving the operating cable 13.

The housing or unit 5 preferably extends the entire distance between the sidewalls 7 of the structure, and comprises a substantially U-shaped inverted housing member 14 extending between and engaging a pair of substantially cup-shaped pulley housings 15 and 16.

Each of the pulley housings is provided with an inwardly extending bearing sleeve or boss 18, which sleeves rotatably support a shaft 19 extending between the two housings. Suitable cover plates 20 are secured to the outer side of each of the housings 15 and 16, as by means of screws 21 and 22, and serve to enclose the pulleys 24 and 25.

As shown in Figures 2 and 3, the pulleys or sheaves 24 and 25 are each suitably keyed to the shaft 19, as by means of a key member 26. The pulleys are each provided with an inwardly extending shoulder 27, which has bearing engagement against the inner surfaces of the pulley housings 15 and 16. The load operating cables 13 are secured to the pulleys or sheaves by means of screws 28, which thread into the pulleys. The cable 13 extends from the pulley down through a suitable channel 28 formed in each of the respective housings 15 and 16, and through an

opening 29 formed in the top wall 6 of the structure to the angle bracket 12 connected to the load.

Secured upon the shaft 19, between the housings 15 and 16, is a bushing member 32, which is nonrotatably locked upon the shaft by means of the tapered pin 33. A tubular spacing member 34 is positioned about the shaft 19 between the bushing 32 and a second bushing 35 which is suitably recessed to receive the bearing member 18 of the pulley housing 15.

As clearly shown in Figure 1, the bearing member or boss 18 of pulley housing 15 is provided with a ratchet 36. A suitable tension spring 38 is coiled about the spacing member 34 and has one end thereof secured in the opening 39 of the flange 32a of bushing 32. At its other end, the spring 38 is nonrotatably secured, by means of the angularly bent portion 40, to flange 35a of the bushing 35, thus positioning the spring 38 between the two bushings 32 and 35 to serve as a tension means therebetween. The radially flanged portion 35a of the bushing 35 also carries a suitable pin 42, which serves as a pivot for a pawl 43, engaging the teeth of the ratchet 36 formed on the pulley housing 15.

By means of this ratchet and pawl locking connection, the bushing 35 can be adjusted with respect to the bearing portion 18 of the housing 15, to place the spring 38 under any desired tension. This tension is transmitted through the bushing 32 and the tapered pin 33 to the shaft 19, and tends to rotate the pulleys 24 and 25 in load raising direction. Preferably, the tension of this spring is so adjusted that the torque of the rotating means when the door is in raised position is substantially equal to the moment of the door and the effective length of the pulley arm when the door is in lowered position, the spring tension thus serving to hold the door or other load raised because of the decrease in the effective length of the pulley radius when the door is raised to its upper position.

Referring now in more detail to the pulley 24, it will be noted, in Figures 2 and 3, that the pulley is eccentrically mounted with respect to the shaft 19. This is also true of pulley 25. The pulleys are so disposed that, when the load is lowered, each pulley occupies the position shown in Figure 2, in which the effective length of the lever arm of the pulley for raising the load is the distance indicated by X, and when the load is raised the pulley occupies the position shown in Figure 3, in which the effective length of the pulley lever arm for holding the load raised is indicated by Y.

The pulley 24 is shown in Figure 2 as being in the position corresponding to the lowermost position of the door 10, and the weight of the door, acting through the lever arm of the length X overcomes the tension of spring 38 tending to open the door, so that the door remains in its lowered position. The spring 38 assists in raising the doors. In the raised position of the doors the moment of the weight of the door times the length Y of the effective lever arm of the pulley, is less than the turning torque imparted to shaft 19 by the spring 38, and the doors remain in their uppermost position.

When the doors are moved downwardly the pulleys are again rotated, and, when the doors reach their lowermost position, the torque on the tension spring 38 is not great enough to counteract the moment of the weight of the door times the effective length of the lever arm, and the doors remain in lowered position.

The doors, or other loads to which the pulleys

are connected, are operated simultaneously and similarly, and the eccentric mounting of the pulleys 24 and 25 serves to retain the doors either in their lowered position or in their raised position without the use of any latching means. By rotating the bushing 35, the tension of member 38 can be adjusted with facility to suit conditions, such as the weight of the loads being lifted. The size of the pulley may be varied, but should be such that in the lowered position of the loads, the maximum length of pulley arm is effective, and in the raised position of the loads, the minimum length of pulley arm is effective. The pulley may rotate through a half revolution, or one and one-half revolutions, or any other suitable distance during movement of the doors from lowered to raised position, or vice versa, to produce this result.

The tension spring may extend substantially the entire length of the shaft connecting the two pulleys, if desired, but ordinarily sufficient tension can be provided by a spring member extending only partially the length of the shaft between the pulleys. The entire operating mechanism is fully enclosed and is of simple and compact construction, requiring no special assembly knowledge or skilled operation. As previously set forth, the operating mechanism may be disposed for parallelly spaced loads, angularly spaced loads, or other positional arrangements of the loads, without any change of construction.

I do not intend to be limited to the exact details shown and described in connection with the preferred embodiment of the invention illustrated, but only in so far as defined by the scope and spirit of the appended claims.

I claim:

1. In combination, a shaft, a pair of pulleys disposed at opposite ends of said shaft, housings for said pulleys, said housings having integral bearing supports for said shaft, a bushing keyed to said shaft, a second bushing mounted on said shaft, a spacing member between said bushings, a spring encircling said spacing member and having its ends secured in said bushings, and means for locking said second bushing against rotation in one direction with respect to one of said pulley housings.

2. In combination, a shaft, a pair of pulleys disposed at opposite ends of said shaft, housings for said pulleys, said housings having integral bearing supports for said shaft, a bushing keyed to said shaft, a second bushing mounted on said shaft, a spacing member between said bushings, a spring encircling said spacing member and having its ends secured in said bushings, ratchet means formed integral with the bearing support of one of said housings, and a pawl carried by said second bushing for engaging said ratchet means.

3. In combination, a shaft, a pair of pulleys eccentrically mounted at opposite ends of said shaft, housings for said pulleys, said housings having integral bearing supports for said shaft, a bushing keyed to said shaft, a second bushing mounted on said shaft, a spring member encircling said shaft and having its ends secured to said bushings, and means for locking said second bushing against rotation in one direction with respect to one of said pulley housings, said means being operable to vary the tension in said spring.

4. In combination, a shaft, a pulley disposed at one end of said shaft, a housing for said pulley

having a bearing portion for said shaft, a bushing keyed to said shaft, a second bushing mounted on the shaft, a spring extending between said bushings and encircling said shaft, said spring

sion to said spring, said pawl holding said bushing against rotation in the other direction.

5 having its ends secured in said bushings, said second bushing being rotatable in one direction to impart tension to said spring, and means for locking said second bushing against rotation in one direction with respect to said pulley housing.

10 5. In combination, a shaft, a pulley disposed at one end of said shaft, a housing for said pulley having a bearing portion for said shaft, a bushing keyed to said shaft, a second bushing mounted on the shaft adjacent said housing, a ratchet

80 bearing portion formed on the opposite side of said housing, a shaft extending through said bearing portion, a pulley mounted on said shaft and disposed within said recess, a cover plate closing said recess, spring means extending helically along said shaft and having one end keyed thereto, ratchet means carried by the other end of said spring and having adjustable engagement with the bearing portion to tension said spring and spacing means about said shaft preventing disengagement of said ratchet means and said bearing portion.

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