Feb. 26, 1924. 1,484,636

G. M. FRENCH

RAISING AND LOWERING MACHINE

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Fig. 1

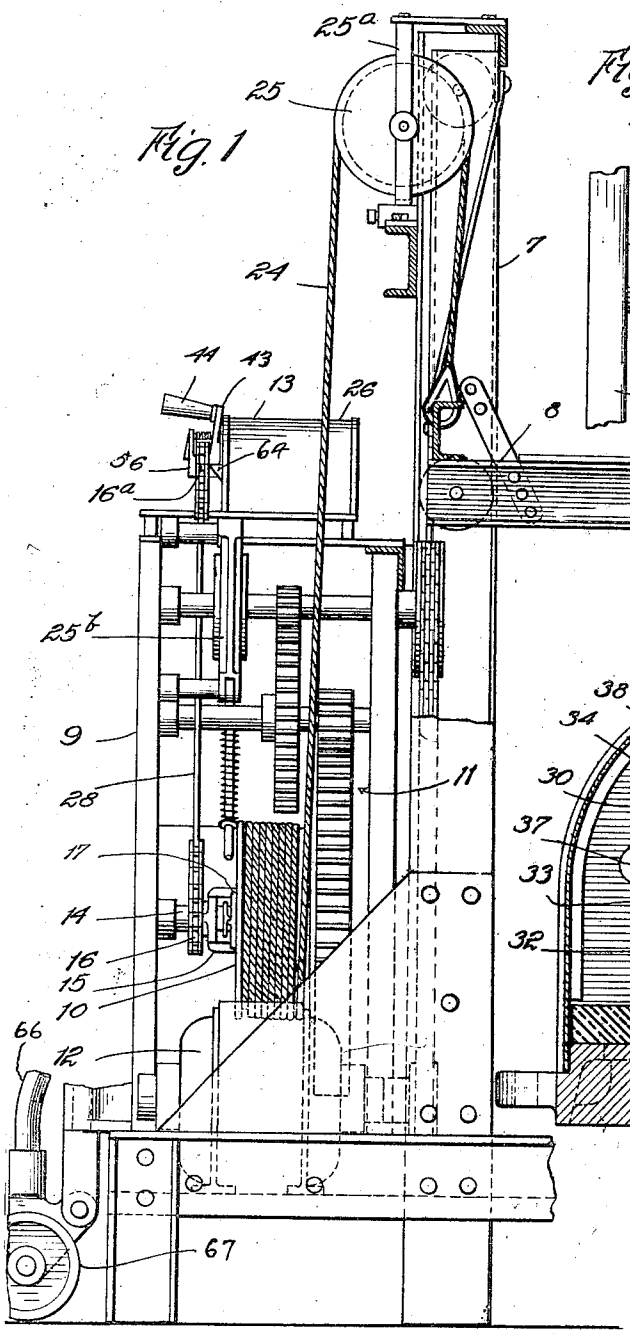



Fig. 2

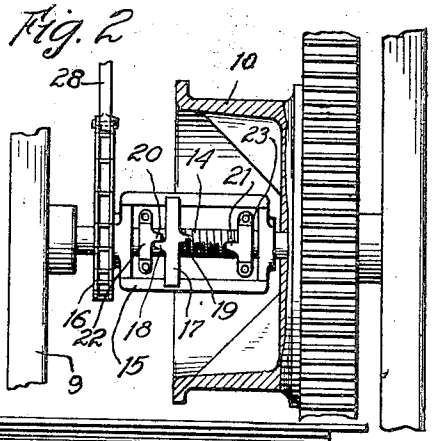
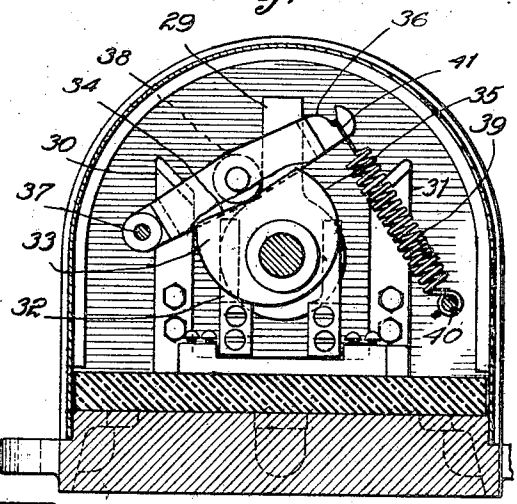



Fig. 3




Inventor
George M. French
By Wills Christel & Parker
Attys

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Fig. 4

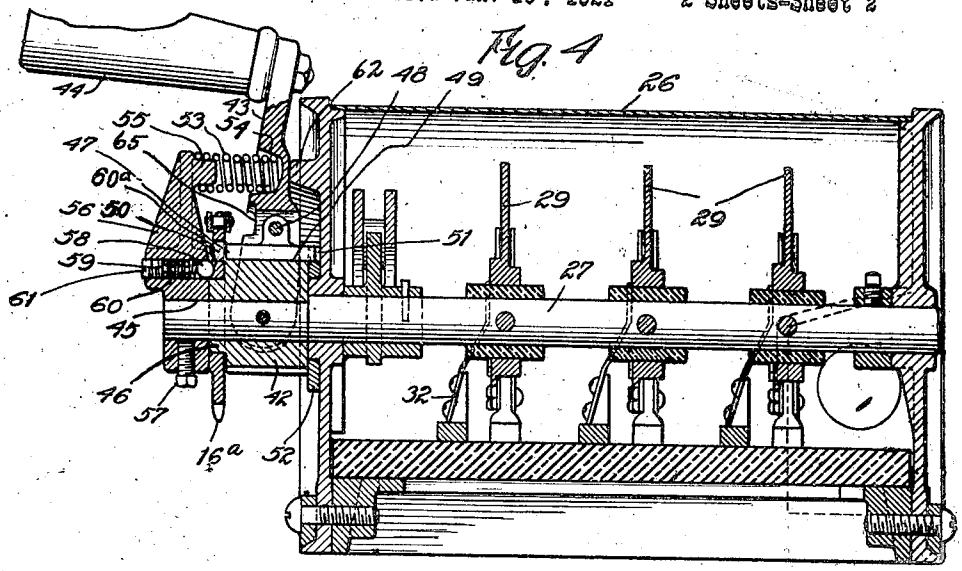



Fig. 5

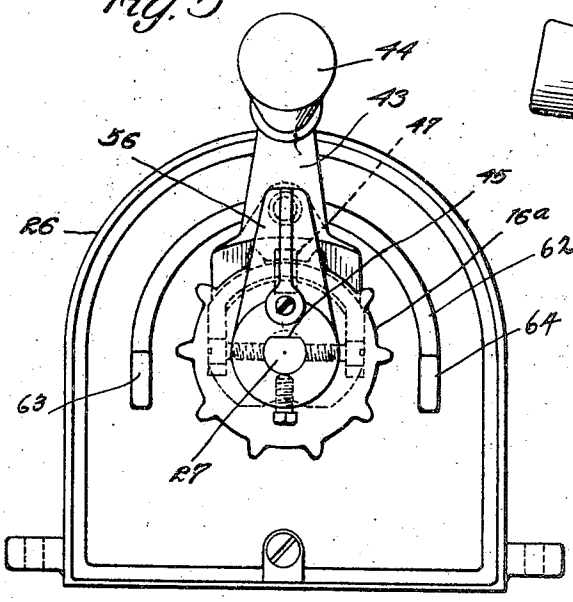
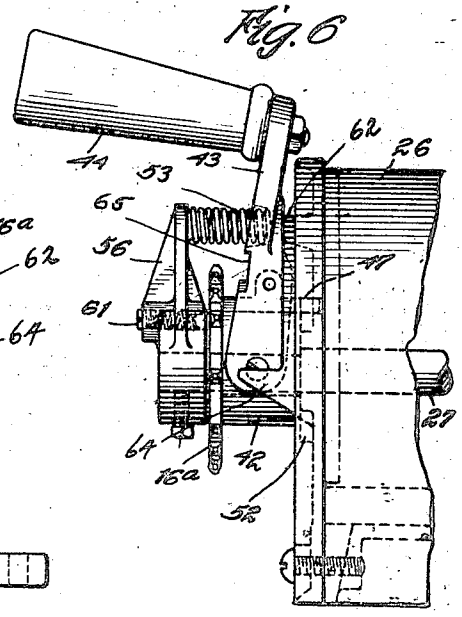



Fig. 6




Inventor
George M. French
By Miller Christy & Parker
Attys

Patented Feb. 26, 1924. 1,484,636

# UNITED STATES PATENT OFFICE.

GEORGE M. FRENCH, OF CHICAGO, ILLINOIS, ASSIGNOR TO ECONOMY ENGINEERING COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

## RAISING AND LOWERING MACHINE.

Application filed January 10, 1921. Serial No. 436,084.

*To all whom it may concern:*

Be it known that I, GEORGE M. FRENCH, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Raising and Lowering Machines, of which the following is a specification.

The invention relates to elevating machines and particularly to machines of the type commonly known as tiering machines, in which a load-supporting platform is guided for up and down movements which are effected by a motor-actuated winding mechanism, the motor being under the control of a switch mechanism adapted to be manually operated to set the machine in motion and automatically operable to stop the motor at either end of movement of the platform.

Tiering machines of the type referred to are usually of the portable type and are employed in warehouses and similar places for raising bundles, boxes, bales and the like from the floor or other support to the top of a tier or stack of similar articles, and vice versa. Difficulty has been experienced in the use of such tiering machines by reason of the failure of the automatically operating means to function properly, especially in the downward movement of the platform under load. This difficulty has arisen from the fact that the switch mechanism, being operatively connected to the platform-actuating means has been capable of operation to the reversing position in the movement of the platform beyond its intended limit of travel, after the power has been cut off. The result is that the platform is suddenly and without warning started upwardly after it has reached the lower limit of its movement.

The object of the present invention is to provide means capable of operating automatically to lock the switch mechanism in a neutral position, in its operation by the platform-actuating means, whereby to insure that the movement of the platform may not be reversed when it approaches the limit of its travel.

A further aim of the invention is to provide a locking means of the character indicated which is of a very practical construction.

In the accompanying drawings wherein I have illustrated a preferred embodiment of my invention, Figure 1 is a fragmentary side elevation of a tiering machine. Fig. 2 is a fragmentary elevation section of the means for automatically actuating the controller or switch mechanism at the opposite limits of movement of the platform. Fig. 3 is a transverse sectional view through the controller and showing the means serving yieldingly to maintain the switch members of the controller in neutral position midway between a pair of oppositely disposed contacts. Fig. 4 is a framentary longitudinal sectional view through the controller and illustrating particularly my improved locking means for the controller. Fig. 5 is an end view of the controller. Fig. 6 is a fragmentary side elevation of the outer end of the controller equipped with the locking means.

Referring first to Fig. 1, the tiering machine shown comprises an upright frame 7 and a platform 8 guided for up and down movements by the frame 7. An auxiliary frame 9 adjacent the upright frame 7 carries the actuating mechanism for the platform including a winding drum 10 connected by a gear train 11 with an electric motor 12. 13 designates generally the controller which is operatively connected with the winding drum so as to be automatically operated thereby as the platform approaches either limit of its movement whereby to cut off the flow of electric energy to the motor and thus prevent injury to the machine.

The drum 10 (Fig. 2) is fixed upon a shaft 14 journaled in the frame 9, and within the drum rotatable on the shaft is a frame 15 having a sprocket wheel 16 rigid therewith. A traveling nut 17 threaded on the shaft 14 and slidably but non-rotatably engaging the frame 15 is provided with lugs 18 and 19 on opposite sides thereof adapted to engage respectively with lugs 20 and 21 on collars 22 and 23 adjustably mounted on the shaft 14. When the shaft rotates, the nut 17 being held normally from rotating by the frame 15, travels in one direction or the other upon the shaft into engagement with either of the fixed collars 22 or 23. When thus locked, the nut is rotated and with it rotates the frame 15 and the sprocket 16. By adjusting the collars upon the shaft the limits of move-

ment of the platform may be readily determined, as will more fully appear hereinafter.

The drum 10 is operatively connected with the platform 8 by means of a cable 24 fixed at its opposite ends to the platform and the drum and passing over a sheave 25 mounted in a frame 25ª which is swingable on a vertical axis. A brake mechanism 25ᵇ of suitable construction is employed to enable the positioning of the platform at any desired elevation.

The controller 13 comprises a casing 26 suitably supported as by means of the frame 9 and having a rock shaft 27 (Fig. 4) journaled therein and extending longitudinally thereof with one end projecting from the outer end of the case. Upon said projecting end of the shaft is mounted an actuating member in the form of a sprocket wheel 16ª which is connected by means of a chain belt 28 with the sprocket 16 on the drum shaft 14. The shaft 27 is thus adapted to be rocked in one direction or the other at the upper or lower limit of movement of the platform as determined by the position of the collars 22 and 23 upon the shaft 14.

Within the casing 26 a plurality of arms or switch members 29 are fixed, which are adapted to engage with knife blade contacts 30 and 31 on opposite sides of the shaft 27. The switch members are each provided with a spring contact member 32 which, together with the contacts 30 and 31 are suitably connected in a manner well known and not herein shown with a source of electric energy and the motor 12, so that the switch members are adapted when operated to either extreme position to close a circuit to effect the upward or downward movement of the platform.

For convenience herein, the circuits closed when the switch members engage with the contacts to effect the upward movement of the platform, are termed the "up circuits", and the circuits closed by the members 29 engaging with the opposite contacts, to effect the downward travel of the platform, are termed the "down circuits".

For the purpose of yieldingly maintaining the switch members 29 in neutral position, there is provided upon the rock shaft 27 a cam member 33 (Fig. 3) having a flat face 34 and a dwell 35. A lever 36 pivoted at 37 in the case 26 is bifurcated between its ends to receive a roller 38 adapted to engage with the cam member 33. A coiled tension spring 39 anchored at 40 to the case is connected at its opposite end to the lever 36 as at 41 forcing the roller 38 into engagement with the cam. The latter is so positioned upon the shaft 27 that when the roller 38 engages with the flat face 34 upon the periphery of the cam, the switch members 29 on the shaft are in upright or neutral position substantially midway between the contacts 30 and 31.

For the purpose of operating the shaft 27 manually, there is fixed upon the forwardly projecting end thereof, a member 42 upon which is pivotally mounted an operating member or crank arm 43 having a handle 44 at its free end. The arm 43 is bifurcated at its lower end so as to straddle the member 42, and the shaft 27 is flattened at one side as shown at 45 (Fig. 5) so as to hold the member 42 against rotation thereon, the aperture through said member being similarly shaped. It will be seen that by means of the handle 44, the operator may rock the shaft 27 at will to control the movements of the load supporting platform 8.

As hereinbefore indicated, the sprocket wheel 16ª is mounted with reference to the shaft 27 so as to actuate it when rotated in the movements of the winding drum 10. Herein said sprocket wheel 16ª is journaled upon a boss 46 on the member 42, and is held against rotation upon said boss by a key member 47 pivoted at 48 in the arm 43 so as to slide in a keyway 49 provided in the periphery of the member 42. At its outer end the key member 47 is adapted to engage in an aperture 50 provided in the sprocket wheel 16ª, and at its opposite or inner end is adapted to engage in an aperture 51 provided in a collar 52 fixed upon the outer end wall of the casing 26.

When the crank arm 43 is operated to carry the switch members 29 into engagement with either of the contacts 30 or 31, the inner end of the key member 47 engages with the forward face of the collar 52 and is held thereby in such position that the opposite end thereof engages in the aperture 50. The sprocket wheel 16ª is therefore locked with reference to the member 42 by the key member 47 when the arm 43 is moved to either side of its central or neutral position. A coiled compression spring 53 bearing at one end in a socket 54 provided in the outer face of the handle 43 and at its other end surrounding a stud 55 formed upon a member 56 also rigid with the shaft 27, tends to force the arm 43 inwardly, and hence to carry the key member 47 into the aperture 51 in the collar 52. When, therefore, the arm 43 is moved into its mid-position in the movements of the winding drum, the key member 47 is forced by the spring 53 into locking relation with reference to the case 26, whereby to hold the switch members 29 in neutral position. The member 56 is mounted upon the extreme outer end of the shaft 27, and like the member 42 is held against rotation with reference to the shaft, being preferably locked thereon as by means of a set screw 57.

When the arm 43 is thus locked in mid-position, the sprocket 16ª is free to rotate

with reference to the member 42 since the key 47 has been withdrawn from the aperture 50 in the sprocket. Thus, should the platform under the influence of a load continue to descend even after the power had been shut off, the actuation of the sprocket 16ª is incapable of working injury to the parts.

I preferably provide means adapted to hold frictionally the sprocket 16ª from continuing to rotate when not positively actuated by the winding mechanism, and thus to hold the sprocket in operative association with the member 42 so as to permit of the return movement of the key 47 into the aperture 50 by a manual operation of the arm 43. Thus I provide a ball 58 mounted in an aperture 59 in the member 56 and forced by means of a coiled compression spring 60 into engagement with a socket 61 in the outer face of the sprocket 16ª. At its outer end the spring 60 engages with a plug 61 closing the aperture 59. This construction, it will be apparent, serves to hold the sprocket 16ª in position with reference to the member 42 so that the aperture 50 registers with the keyway 49, and at the same time permits of the operation of the sprocket wheel under the action of the winding mechanism should the latter be actuated after the power is cut off.

Preferably, an arcuate guide member or track 62 is provided for the crank arm 43, the spring 53 serving to hold the arm in sliding engagement with the track. At the opposite ends of the track lugs 63 and 64 are provided to form limit stops for the arm 43. The latter, as shown in Fig. 4, has a groove 65 in its outer face to receive the inner edge of the chain on the sprocket 16ª, when the arm is in its outermost position.

The machine is mounted upon suitable rollers or wheels to permit of its movement from place to place. Thus one end of the machine is arranged to be lifted off its supporting legs by a downward pull on the handle 66 to force the steering wheels 67 beneath the machine. The rear supporting wheels are not herein shown.

It will be seen that I have produced a means of a practical character for insuring the machine against injury by the movement of the switch members beyond their neutral position to a reversing position, it being intended that the reverse movements of the platform be wholly dependent upon the manual operation of the arm 43 by the operator.

While the invention herein has been illustrated and described with considerable particularity, it is to be understood that it is not intended that in the interpretation of the appended claims they shall be limited to the particular construction and arrangement set forth except as may be necessitated by the state of the prior art.

I claim as my invention:

1. In an elevating machine, the combination with a vertically movable platform and means for raising and lowering the platform, of a controller including an operating member, means operable as the platform approaches either limit of its movement to actuate said member whereby to render the raising and lowering means inoperative, and means for locking said member while permitting the platform to continue to travel.

2. In an elevating machine, the combination of a controller having a shaft, an actuating member on the shaft, switch mechanism operable to open and close a motor circuit in the rocking movements of said shaft, and means normally holding said actuating member against rotation on the shaft, said means being operable into position to lock the shaft against movement while permitting the continued movement of the actuating member.

3. In an elevating machine, the combination of a controller having a shaft, switch mechanism operable in the movement of the shaft to open and close the motor circuit, an actuating member for the shaft, means normally holding the actuating member against movement with reference to the shaft, said means being operable into position to lock the shaft against movement while permitting said member to continue in its movement, and means tending yieldingly to hold the actuating member against movement on the shaft.

4. A controller for elevating machines comprising, in combination, a shaft, switch mechanism operable in the movements of the shaft to open and close the motor circuit, an actuating member normally held against movement on the shaft, locking means for said shaft adapted to release said actuating member, and means adapted yieldingly to hold said member against movement with reference to the shaft when released by said locking means.

5. A controller for an electric motor comprising, in combination, switch mechanism operable to open and close the motor circuit, an operating member for said mechanism, actuating means for said operating member, and means operatively associated with said operating member adapted normally to lock it with reference to said actuating means and operable in the movement of the operating member by said actuating means to lock the operating member against movement while permitting the actuating means to continue its movement.

6. A controller for elevating machines comprising, in combination, a casing, a shaft journaled in said casing, a pair of stationary contacts, a movable contact on said shaft operable into engagement with said stationary contacts, a part fixed on said shaft exte-

rior of the casing, an arm pivoted on said part, an actuating member mounted so as to be capable of rotation with reference to said shaft, and a key member carried by said arm and adapted in one position of the latter to lock said actuating member with reference to said shaft and in another position of the arm to lock the arm with reference to the casing.

7. A controller for elevating machines comprising, in combination, a casing, a shaft journaled in said casing, a pair of stationary contacts, a movable contact on said shaft operable into engagement with said stationary contacts, a pivoted arm carried by the shaft, an actuating member mounted so as to be capable of rotation with reference to said arm, a key member carried by said arm and adapted in one position of the latter to lock said actuating member with reference to said arm and in another position of the arm to lock the arm with reference to the casing, and spring means acting upon said arm tending to force it into locking engagement with the casing.

8. A controller for electric motors, comprising, in combination, an operating shaft, a member fixed against rotation with reference to said shaft, a stationary part adjacent said member, means for actuating said shaft, and means carried by said member adapted in the movements thereof from one position to another in the operation of the controller positively to engage said stationary part whereby to lock said member and thereby said shaft against movement by said actuating means.

9. A controller for electric motors comprising, in combination, an operating shaft, a member fixed against rotation with reference to said shaft, a stationary part adjacent said member, means for actuating said shaft, and means carried by said member adapted in the movements thereof from one position to another in the operation of the controller positively to engage said stationary part whereby to lock said shaft against movement by said actuating means, said locking means being adapted normally to hold said actuating means against movement with reference to said member but releasing the actuating means for movement when the shaft becomes locked.

10. In a controller for electric motors, the combination of a rock shaft, a member fixed upon said shaft, an arm pivoted on said member, an actuating member for the shaft, a key member carried by said arm adapted in one position of the arm to lock the actuating member against movement with reference to said shaft and in another position of said arm to lock the arm against movement whereby to hold the shaft stationary.

11. In a controller for electric motors, the combination of a rock shaft, an arm pivotally mounted on said shaft transversely thereof, an actuating member for the shaft, a key member carried by said arm adapted in one position of the arm to lock the actuating member against movement with reference to said shaft and in another position of said arm to lock the arm against movement whereby to hold the shaft stationary, a second arm fixed upon said shaft, and a spring bearing between the last mentioned arm and said pivoted arm whereby normally to force the key member into position to lock the shaft against movement.

12. In a controller for electric motors, the combination of a rock shaft, an arm pivotally mounted on said shaft transversely thereof, an actuating member for the shaft, a key member carried by said arm adapted in one position of the arm to lock the actuating member against movement with reference to said shaft and in another position of said arm to lock the arm against movement whereby to hold the shaft stationary, and means adapted yieldingly to hold the actuating member against movement with reference to the shaft when released by said key member.

13. In an elevating machine, the combination of a load-supporting platform, means for raising and lowering the platform including an electric motor, a controller for said motor including a rock shaft, means for manually operating said rock shaft, means operable as the platform approaches either limit of its movement whereby to actuate automatically said shaft to stop the motor, and means normally connecting said manual means with said automatic means and operable in the movement of the shaft by said automatic means to positively lock the manual means and thereby said shaft against movement while permitting the automatic means to continue to operate.

In testimony whereof, I have hereunto set my hand.

GEORGE M. FRENCH.