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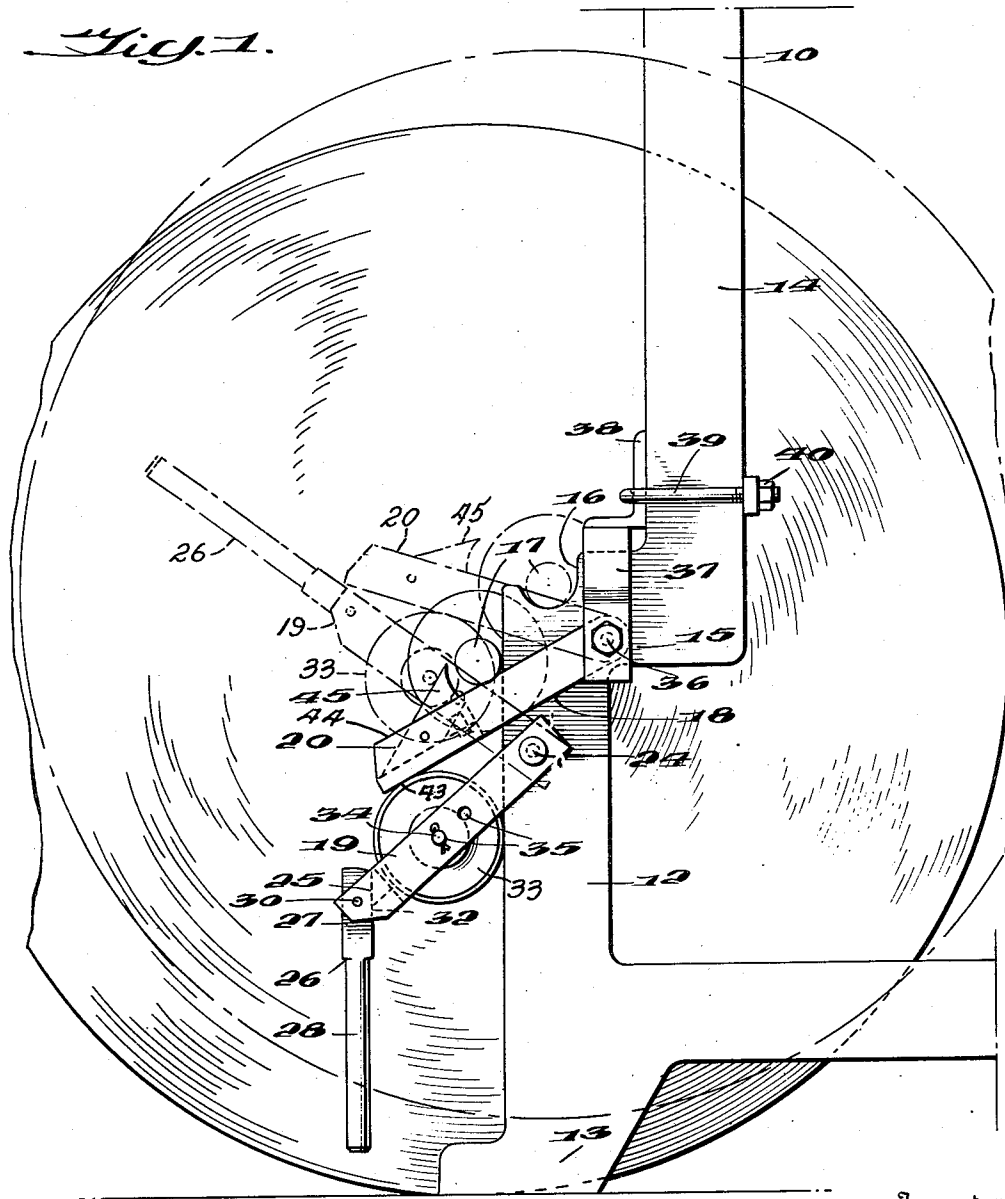
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2,570,941

MECHANICAL LIFTING DEVICE

Filed April 13, 1949

3 Sheets-Sheet 1



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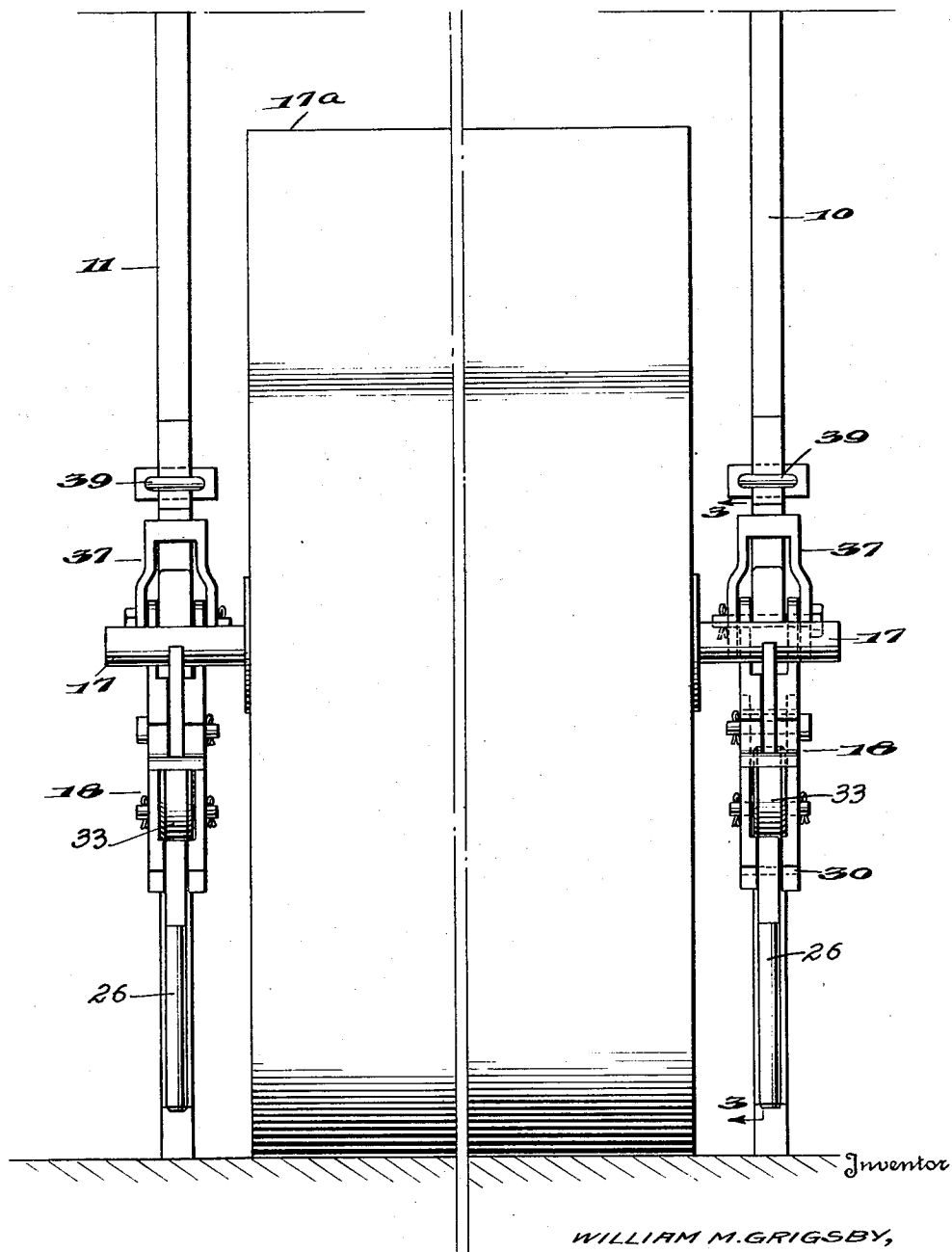
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Fig. 2



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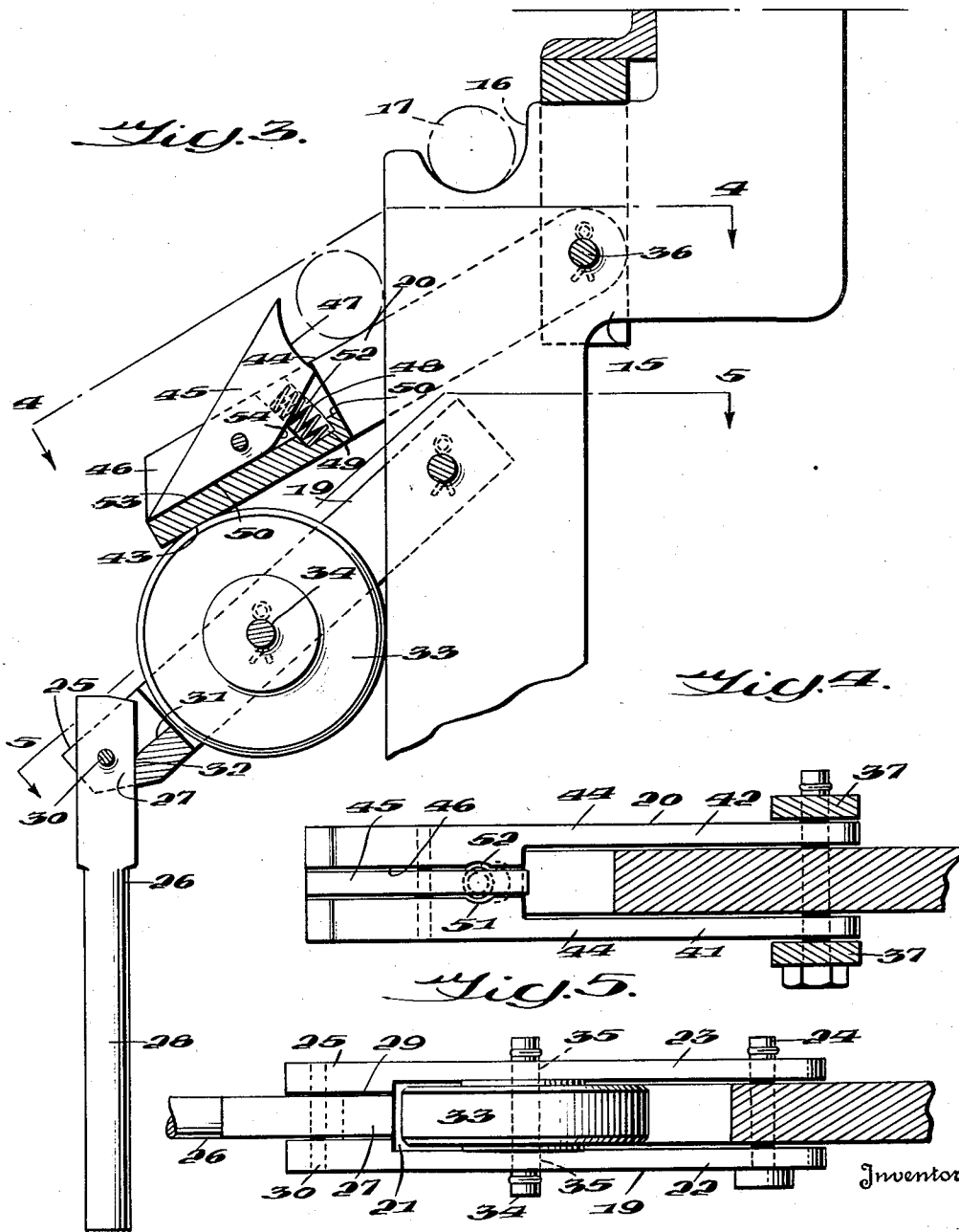
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UNITED STATES PATENT OFFICE

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MECHANICAL LIFTING DEVICE

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5 Claims. (Cl. 242—58)

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This invention relates to mechanical lifting devices and more particularly to manually operated mechanical lifting devices adapted to the lifting of rolls of paper to the frame mill roll racks of paper bag and like machines.

In the operation of many types of machines, such as paper bag machines and the like, which continuously process paper into various articles the paper used is generally fed to the machine from large rolls. These are usually mounted on a portion of the framework of the machine designed for that purpose and when a roll is used up the roll shaft must be removed and replaced by a new roll of paper. The procedure generally used in putting rolls of paper on the machine is that the operator rolls the paper to the machine and then lifts the roll by hand, one end at a time, onto the machine. This is a difficult and time-consuming operation and since the rolls are usually quite heavy very often results in the operator straining himself.

A primary object of the invention, therefore, is the provision of a mechanical lifting device for lifting relatively heavy objects or articles, such as paper rolls, with a minimum of effort and time.

Another object of the invention is the provision of a manually operated lifting device wherein rolls of paper or the like may be quickly and easily lifted from a supporting surface, such as a floor, to the frame of a machine for utilizing such paper.

Still another object of the invention is the provision of a mechanical lifting device of the compound lever type which is adapted to be attached to the frame of a machine, such as a paper bag machine, to facilitate the lifting of rolls of paper onto a portion of the frame thereof.

These and other objects and advantages of the invention will be apparent to persons skilled in the art from a consideration of the attached drawings and annexed specification illustrating and describing a preferred embodiment of the invention.

In the drawings:

Fig. 1 is a side elevational view of the device showing in full lines the position of the parts preparatory to lifting a roll of paper onto a frame member and showing in broken lines the position of the parts after the roll has been lifted into position;

Fig. 2 is a front elevational view showing the application of the device to spaced frame members for lifting the terminal ends of a shaft such as that supporting a paper roll;

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Fig. 3 is a vertical cross-sectional view of the device taken along the line 3—3 of Fig. 2;

Fig. 4 is a cross-sectional view of the device taken along the line 4—4 of Fig. 3; and,

Fig. 5 is a cross-sectional view of the device taken along the line 5—5 of Fig. 3.

Referring now to the drawings the numerals 10 and 11 denote spaced frame members which may constitute portions of the framework of a paper bag or like machine or alternatively may be separately formed frame members suitably constructed and positioned to carry out the purposes of the invention. As illustrated herein each of the frame members 10 and 11 preferably comprises a lower portion 12 provided with a suitable supporting base or foot 13 and an upper offset portion 14 connected with the lower portion 12 by a horizontal portion 15. At its upper end the lower portion 12 is provided with a rounded out or concavely curved bearing seat 16 adapted to receive and rotatably support the terminal end of a shaft 17 carrying a roll of paper or the like 17a. As is well known in the art paper is continuously withdrawn from the roll 17a and utilized in the machine with which it is associated. When the roll of paper has been exhausted the shaft 17 must be removed and a new roll lifted into position as shown in Figs. 1 and 2.

In accordance with the present invention this is accomplished by compound lever mechanisms 18, one of these being mounted on each of the frame members 10 and 11 below the shaft-supporting seats 16. Each of the compound lever mechanisms 18 comprises a lower lever 19 and an upper lever 20. The lower lever 19 is pivotally mounted on the lower frame portion 12 adjacent the outer edge thereof so that it may be swung about its pivot from the downwardly inclined full line position to the upwardly disposed broken line position shown in Fig. 1. Preferably the lever 19 is bifurcated as at 21 throughout a substantial portion of its length and the furcations 22 and 23 thereof disposed on opposite sides of the frame portion 12 and pivotally connected thereto by the pivot pin 24.

The end portion 25 of the lever 19 carries a handle 26 having a portion 27 which is preferably square or rectangular in shape for connection with the lever and a rounded portion 28 for grasping by the hand of an operator. The portion 27 of the handle is desirably received in a groove or slot 29 formed in the end portion 25 and is preferably pivotally mounted therein by the pivot pin 30 so that the handle may hang freely downwardly when not in use. To permit

free hanging of the handle as shown the bottom 31 of the groove or slot 29 is stopped short of the end of portion 25 as by bevelling the lower end thereof as shown at 32. In the construction shown, the handle 26 may be rotated clockwise (Fig. 1) from its freely hanging position until the bottom of the portion 27 thereof contacts the bottom 31 of the groove or slot 29 at which time the handle 26 and lever 19 will move as a unit. When released the handle will again resume its freely hanging position.

Intermediate the ends thereof the lever 19 carries a roller 33, the lower surface of which normally rests against the frame portion 12 when the device is not in use, and the upper surface of which has rolling contact with the lever 20 as will appear more clearly hereinafter. The roller 33 is preferably mounted on a pivot pin 34 passing through openings 35 in the furcations 22 and 23 and is disposed between the furcations as shown in Fig. 5. Since the size and position of the roller 33 will vary according to the design of the machine with which the device is used additional openings 35 may be provided in the furcations 22 and 23 so that the pivot pin 34 may be disposed in desired alternate positions.

The location of the pivot point of the upper lever 20 is influenced by a number of factors, such as the design of the machine, mechanical advantage desired, and the like. In the construction shown it is located above and to the rear of the pivot pin 24 of the lower lever 19 in order to obtain the desired mechanical advantage from the particular compound lever arrangement shown. It is also located below and somewhat to the rear of the shaft-supporting or bearing seat 16 so that when the lever 20 is raised to the broken line position shown in Fig. 1 the shaft will roll downwardly along the upper surface thereof into the seat 16.

Preferably the lever 20 is pivoted at 26 on a yoke member 37 carried by a bracket 38 secured to the upper frame portion 14 in any suitable manner as by the U-bolt 39 and nuts 40. The yoke member 37 straddles the horizontal frame portion 15 so as to mount the lever 20 above and in the same vertical plane as the lever 19. The lever 20 is bifurcated similarly to the lever 19 so that the furcations 41 and 42 thereof may be disposed on opposite sides of the lower frame portion 12 and so that the lever 19 may be swung from the full to the broken line position shown in Fig. 1.

Beyond the furcations 41 and 42 the lever 20 is provided with a lower bearing surface 43 adapted to rest on the roller 33 and to roll therealong as the levers move upwardly about their pivots. The upper surface 44 of the lever 20 is designed to receive and support the terminal end of a paper roll or like shaft. To prevent the shaft rolling off the supporting surface 44 as the lever 20 moves upwardly about its pivot a retaining latch 45 is provided. The latch 45 is pivotally mounted in a groove 46 of the lever 20 and has a concavely curved end portion 47 which normally projects above the upper surface 44 of the lever 20 to engage the shaft of a paper roll or the like and prevent it from rolling off the lever. The latch 45 is urged to locking position by a spring 48 mounted in a recess 49 formed in the bottom 50 of the groove 46. The sides of the groove 46 are recessed as shown at 51 and 52 to accommodate the spring 48 and retain it in position during pivoting movement of the latch 45. Coun-

terclockwise movement of the latch 45 is limited by the bevelled end portion 53 thereof coming in contact with the groove bottom 50. Clockwise movement of the latch 45 is resisted by the spring 48 and is limited by the side face 54 thereof coming into contact with the groove bottom 50.

When it is desired to place a roll of paper in position on the frames 10 and 11 the operator simply moves the roll, usually by rolling it, until the terminal ends of the shaft 17 thereof are positioned above the lower ends of the upper lever 20. The operator then moves the roll toward the frame members 10 and 11 until the ends of the shaft are positioned above the outwardly projecting curved end portions 47 of the latches 45. During this operation the shaft ends may or may not strike the latches 45. In the event they do the latches merely pivot downwardly into the grooves 46 until the shaft ends have cleared them, at which time they spring outwardly into latching position under the influence of the springs 48. The roll is then in position to be lifted.

In lifting the roll the operator generally positions himself between the handles 26 where he can grasp one of the handles in each hand. He then lifts upwardly on the handles simultaneously until the upper and lower levers on each side are positioned as shown in broken lines in Fig. 1. At this point the shaft ends roll downwardly along the surfaces 44 of the levers 20 and drop into their bearing seats 16. The handles are then lowered until the levers resume the position shown in full lines in Fig. 1 with the lower portion of the roller 33 resting against the frame portion 12 and the upper portion of the roller 33 in contact with the lever 20.

The device of the present invention increases the lifting power of the operator by approximately 500 percent. Thus a roll that weighs 500 pounds may be lifted in place by the application to each handle of a lifting force of about 50 pounds. The use of the device of this invention also results in considerable savings in time since a roll may be changed in a fraction of the time heretofore required.

One of the features of the compound lever arrangement of the present invention is that the lifting power is greatest during the initial and final stages of lifting. Thus in the full line position of Fig. 1 the point of contact between the roller 33 and lever 20 is at its maximum distance from the point at which the end of the shaft representing the load is supported thereby affording the greatest mechanical advantage. As the levers move upwardly about their pivots the roller 33 rolls slowly inwardly along the bottom surface of the lever 20 and gradually decreases the distance between the point at which the load is supported and the point of contact between the roller 33 and lever 20 thereby diminishing the mechanical advantage. This takes place until the lever 20 has moved upwardly slightly past a horizontal position at which point the shaft ends roll downwardly along the surface 44 into contact with the outer edges of the lower frame portions 12. This increases the distance between the point at which the load is supported and the point of contact between the roller 33 and lever 20 thereby increasing the mechanical advantage during the final stages of lifting. Thus it will be seen that the lifting power is greatest during the initial and final stages of lifting when it is most needed and that the gradual decrease therein during the intermediate stage of lifting

is counterbalanced by virtue of the operator being able to exert a greater lift at this point with little, if any, increase in effort.

Various modifications of the invention described and illustrated will most likely occur to those skilled in the art to which the invention relates and may be made without departure from the spirit of the invention, the scope of which is indicated in the attached claims.

I claim:

1. A mechanical lifting device operable to lift a shaft to a supporting framework comprising a frame member having a shaft-receiving bearing, a lever pivotally mounted on said frame member below said shaft-receiving bearing and having a shaft-supporting portion and a bearing portion, a second lever pivotally mounted on said frame member below said first mentioned lever and carrying a roller thereon adapted to contact said bearing portion, and handle means for pivoting said second lever about its pivot to raise said first mentioned lever upwardly and lift a shaft into said shaft-receiving bearing.

2. A mechanical lifting device comprising a frame member having a shaft-supporting portion, a lever pivotally mounted on the frame member below the shaft-supporting portion, a roller mounted on said lever intermediate the ends thereof, a second lever pivotally connected to said frame member above said first mentioned lever, said second lever having a portion thereof resting on said roller, a shaft-supporting portion on said second lever adapted to support a shaft between the pivot and roller contacting portions, and a handle member connected to said first mentioned lever for swinging it upwardly about its pivot, upward swinging movement of said first mentioned lever acting through said roller to swing the second mentioned lever upwardly and lift a shaft carried thereby to the shaft-supporting portion of said frame member.

3. A mechanical lifting device as set forth in

claim 2 in which said levers are bifurcated and the furcations thereof positioned on opposite sides of said frame member and pivoted thereto.

4. A mechanical lifting device as set forth in claim 2 in which said second mentioned lever carries a pivoted spring-pressed latch adapted to retain a shaft on the shaft-supporting portion of said lever inwardly of the point of contact of said lever with said roller.

5. A mechanical lifting device comprising spaced frame members having shaft-supporting portions adapted to support the terminal ends of a paper roll or like supporting shaft, said frame members having mounted thereon compound lever devices comprising upper and lower lever members pivotally connected to the frame members below the shaft-supporting portions, said lower lever members having rollers mounted thereon, said upper lever members having portions thereof adapted to rest on said rollers, shaft-supporting portions on said upper lever members adapted to support the terminal ends of a shaft, and handle means connected to said lower shafts for swinging them upwardly about their pivots, upward swinging movement of said lower lever members acting through said rollers to swing the upper lever members upwardly to lift the ends of a shaft carried thereby to the shaft-supporting portions of said frame member.

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