E. G. GEBAUER.

UNIVERSAL ELEVATING AND LOWERING DEVICE.

APPLICATION FILED DEC. 24, 1907.

900,515.

Patented Oct. 6, 1908.

3 SHEETS—SHEET 1.

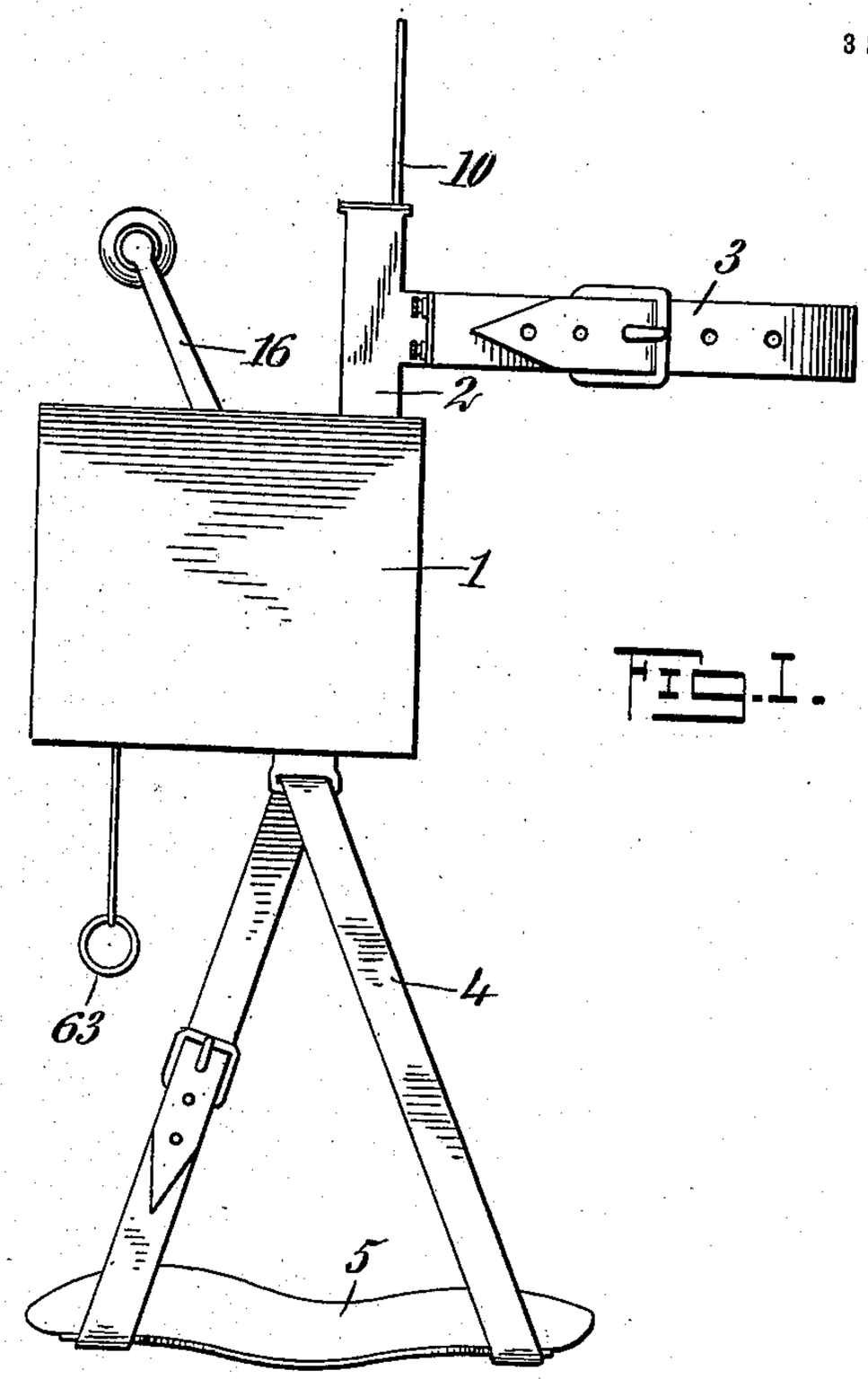


FIG. I.

FIG. 2.

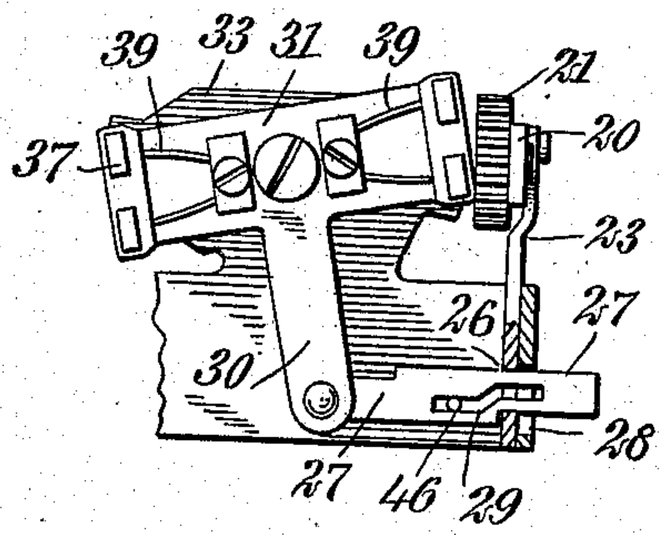
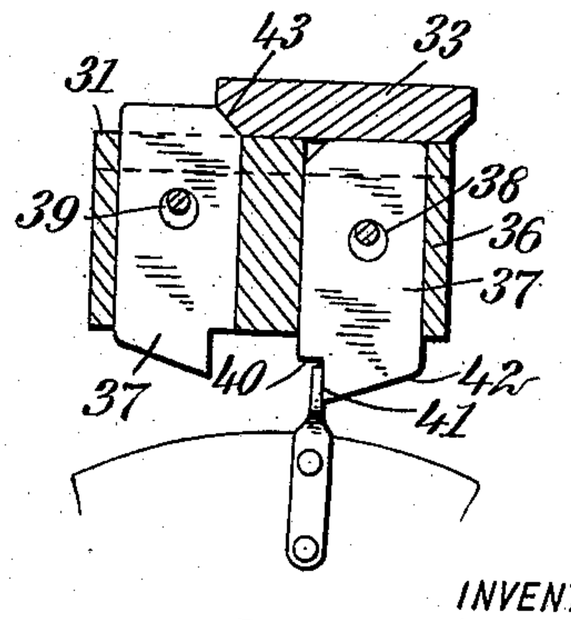


FIG. 3.



WITNESSES

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3 SHEETS—SHEET 2

Fig. 2.

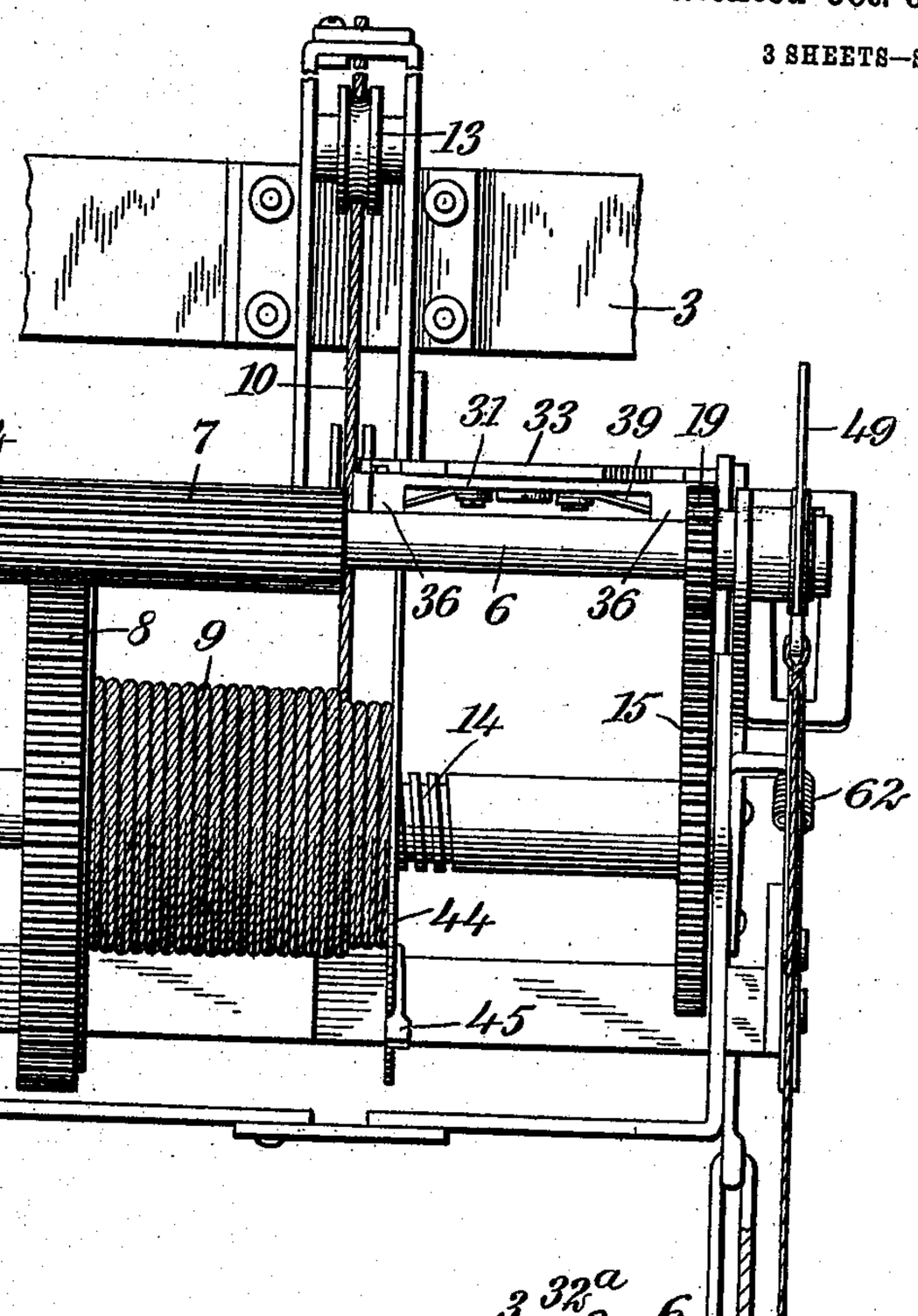


Fig. 2a.

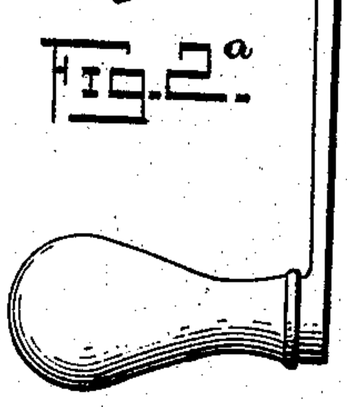
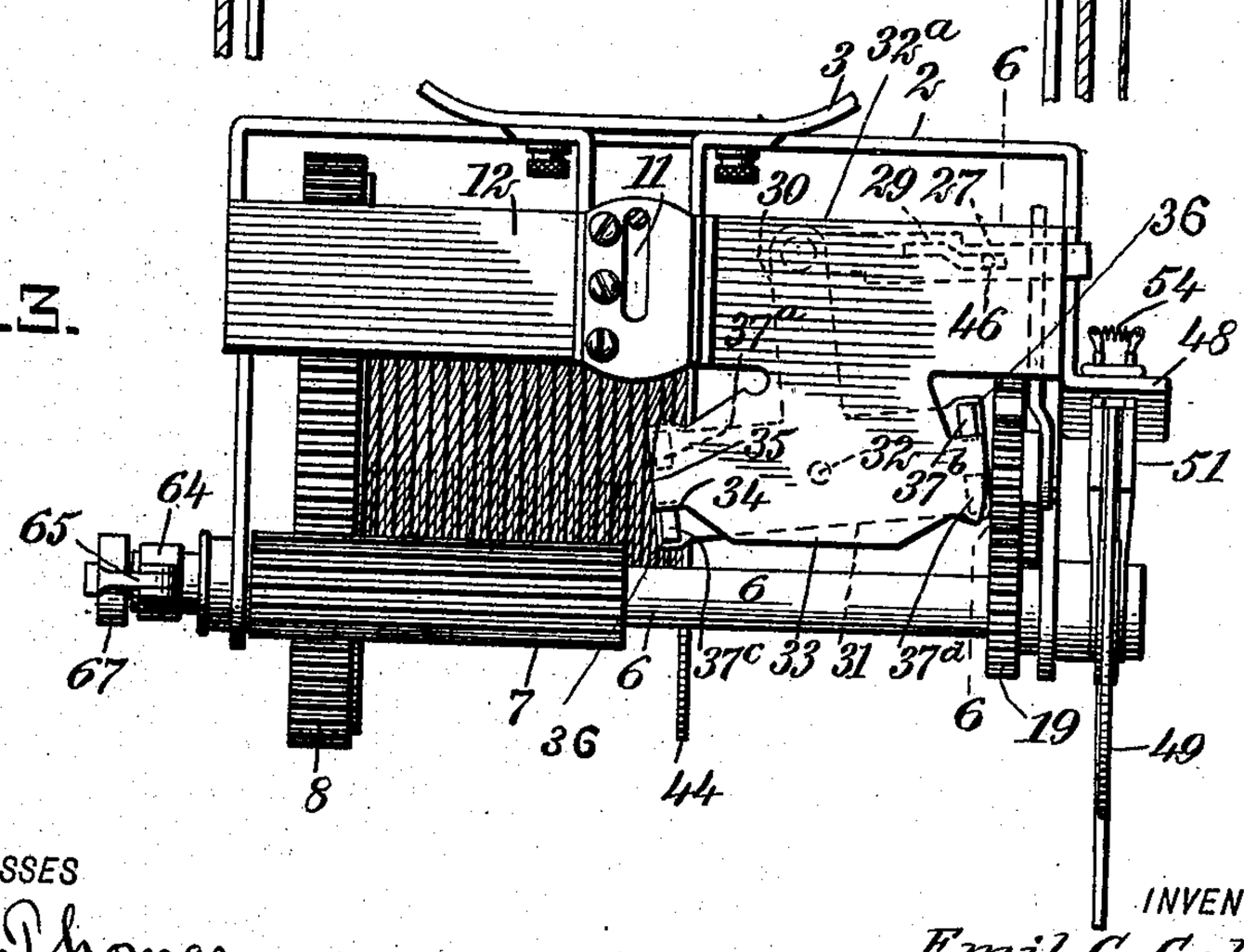


Fig. 3.



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3 SHEETS—SHEET 3.

FIG. 5.

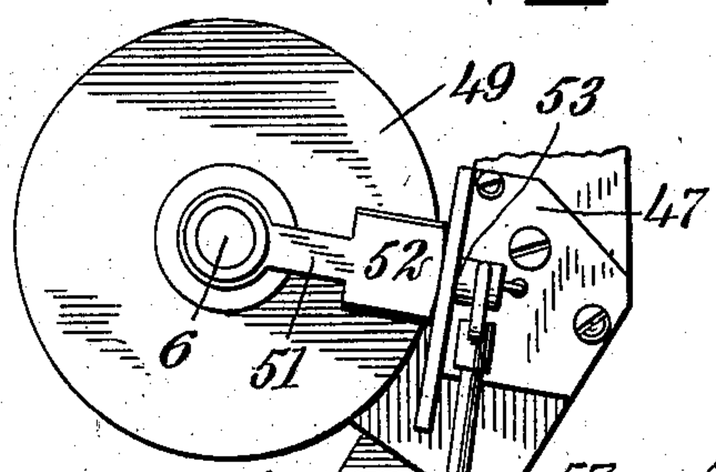


FIG. 4.

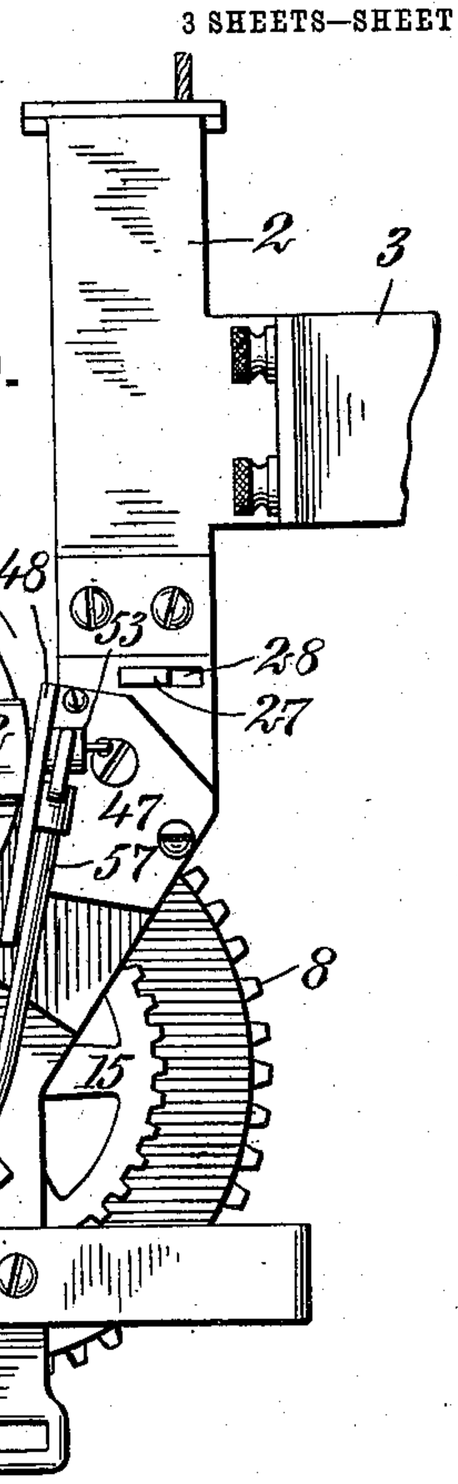


FIG. 6.

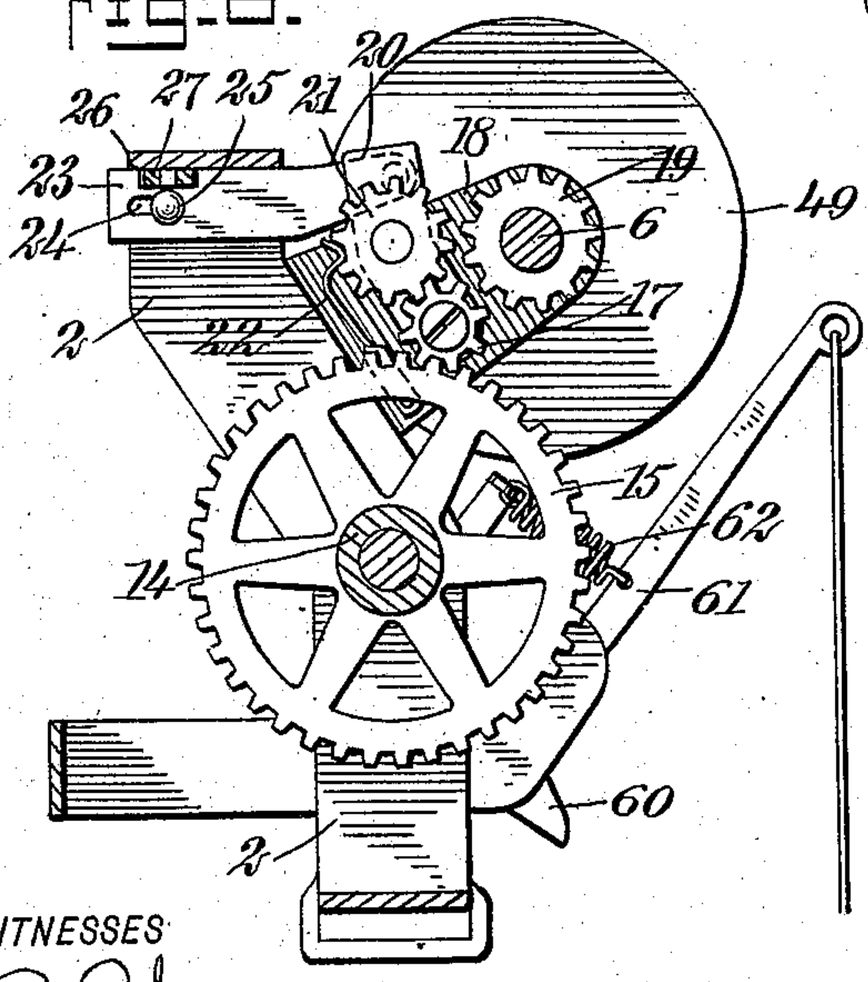
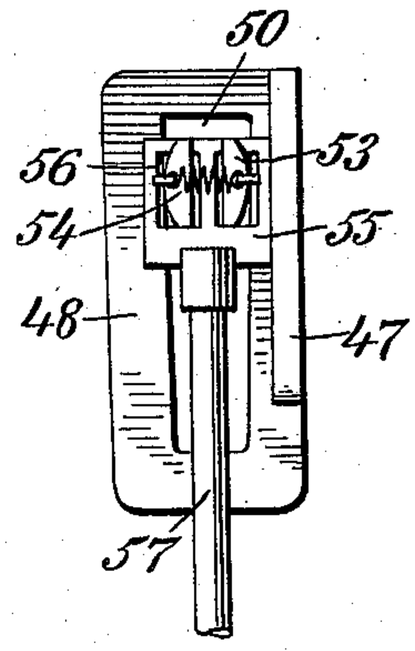


FIG. 7.



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UNIVERSAL ELEVATING AND LOWERING DEVICE.

No. 900,515. Specification of Letters Patent. Patented Oct. 6, 1908.

Application filed December 24, 1907. Serial No. 407,900.

To all whom it may concern:

Be it known that I, EMIL G. GEBAUER, a citizen of the United States, and a resident of Santa Fe, in the county of Santa Fe and Territory of New Mexico, have invented a new and Improved Universal Elevating and Lowering Device, of which the following is a full, clear, and exact description.

This invention relates to elevating and lowering devices and especially to devices of this class employing a cable which wraps upon a drum.

The object of the invention is to provide a construction which will operate to maintain the cable in a constant position as it coils or uncoils from the drum. To this end, I provide improved means for controlling the operation of the drum in such a way that it will travel to and fro as it rotates, the reversing of its travel being accomplished automatically.

I have described below a small type of the machine adapted to be hand-operated and supported on a suspending cable. This type is useful for workmen or artisans of all kinds, but the principles of the invention are applicable to elevating and lowering devices of larger type driven by power and used for any purpose.

A further object of the invention is to provide improved means for controlling the operation of the drum and for setting a brake upon the mechanism when it is desired to hold the suspended body in a fixed position.

The invention consists in the construction and combination of parts to be more fully described hereinafter and particularly set forth in the claims.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a side elevation of the complete device; Fig. 2 is a front elevation of the mechanism of the device, certain parts being broken away; this view represents the mechanism as removed from the case; Fig. 2^a is an end elevation of the crank shaft of the machine and illustrating the manner of attaching the crank thereto; Fig. 3 is a plan of the device as illustrated in Fig. 2, certain parts being broken away; Fig. 4 is an end elevation of the mechanism shown in Fig. 2, viewed from the right end; Fig. 5 is a view similar to Fig. 4, showing only a portion of the mechanism, and illustrating the parts in a different position from that shown in Fig. 4, to illustrate the manner of controlling the brake; Fig. 6 is a vertical section through the device, taken on the line 6—6 of Fig. 3, and looking toward the right; Fig. 7 is a rear elevation of the brake shoes and showing their guide and a portion of the brake rod; in this view the parts appear as in Fig. 5 when viewed from the right-hand side, the lower portion of the mechanism being omitted; Fig. 8 is a horizontal section looking upwardly, taken through the right-hand portion of the machine as viewed in Fig. 3, and illustrating the trip plate and its connected parts; and Fig. 9 is a vertical section through the trip plate and its contiguous parts, and illustrating the manner in which this plate is actuated automatically by the drum of the machine.

Before proceeding to a detailed description of the mechanism, it will facilitate the disclosure to state at the outset, that the drum referred to above and which constitutes a part of the mechanism, is mounted so that as it rotates, it advances longitudinally. In this way, the cable passing from the drum is maintained at a fixed position with respect to the frame of the mechanism. The drum is rotated continuously by means of a suitable crank, and mechanism is provided for automatically reversing the sliding movement of the drum at the ends of its travel to and fro.

Referring more particularly to the parts, and especially to Fig. 1, 1 represents the case of the device, in which there is provided a frame 2. This frame projects above the case, and is provided with a belt 3 which is adapted to pass around the body of the workman operating the device. The frame 2 also projects below the case, and is provided with straps 4 which suspend a seat 5 in which the workman sits.

Referring now particularly to Figs. 2 and 3, in the frame 2 a horizontal crank shaft 6 is rotatably mounted, and substantially one-half portion of this shaft is covered by an elongated pinion 7. This pinion meshes with a gear wheel 8 which is rigidly carried by a drum 9 upon which the cable 10 is coiled, as shown. This cable passes upwardly through a guide slot 11 formed in the upper horizontal plate 12 of the frame, passing

across a guide pulley 13 arranged in the upper portion of the frame, as indicated in Fig. 2. The drum 9 is mounted as a nut upon a feed screw 14, which feed screw is rotatably mounted in the frame coaxially with the drum 9. At the extremity of the feed screw 14 which lies opposite to the gear wheel 8, the feed screw is provided with a rigid gear wheel 15, the purpose of which will appear more fully hereinafter. The shaft 6 is provided with a crank 16, or pulleys.

From the construction described, it will now appear that if the crank shaft 6 is rotated, the drum 9 will be rotated, and at the same time the drum will advance on the feed screw 14 when the feed screw is held fixed. Thus, if the crank 16 were rotated in a right-hand direction, that is, away from the observer, as indicated in Fig. 2, the drum 9 in rotating, will advance toward the left. If the crank is rotated in the other direction, the drum will advance toward the right.

I provide mechanism by means of which the screw 14 may be held fixed, and also by means of which the feed screw may be rotated at a greater speed than the drum so as to enable the drum to have a to and fro movement or travel upon the screw.

Referring now especially to Fig. 6, the gear wheel 15 referred to above is adapted to be driven by a pinion 17 which is attached to a bracket 18 projecting from the main body of the frame as indicated, and near this pinion 17 the crank shaft 6 is provided with a rigid pinion 19. On the axis of the pinion 17 there is pivotally mounted an arm 20 which extends upwardly in an inclined direction as shown. Upon this arm there is loosely mounted an idler gear 21. This gear 21 meshes with the pinion 17 and is adapted to be thrown over so as to mesh with the pinion 19, at certain times in the operation of the machine. When in the position shown in Fig. 6, the teeth of the pinion 21 come in contact with a resilient stop or detent 22 which is attached to the side of the bracket 18. When the idler gear 21 is in this position, the detent 22, of course, operates to prevent its rotation and also that of the feed screw 14. I provide automatic means for bringing about this connection between the idle gear 21 and the pinion 19, when the drum has reached the limit of its movement with the feed screw 14 fixed. For this purpose, to the arm 20 there is pivotally attached a slide 23 which is guided across the under side of the horizontal plate 12, the said slide being provided with a slot 24 through which a suitable pin or roller 25 passes, the said pin being attached in the side of the frame 2 so as to constitute a guide for the slide. In the upper edge of this slide 23 I provide a notch 26, and this notch receives the free extremity of a cam plate 27, indicated in dotted lines in Fig. 3. The extremity of this cam plate, when it is projected in a manner which will be described later, passes through an opening 28 formed in the side of the frame, as illustrated most clearly in Fig. 4. This cam plate is provided with an offset longitudinally disposed cam slot 29, as shown in Fig. 3, and its extremity is pivotally attached to the rearwardly projecting arm 30 of a trip plate 31. This trip plate is pivotally mounted at 32 upon the under side of the horizontal wing plate 32[a]. In order to bring the trip plate to the proper position to cooperate with the other parts, the wing plate 32[a] is provided with a forward extension or wing 33 to which the attachment is made as shown. This wing 33 is elongated in a direction parallel with the crank or drive shaft, and its ends are formed into projecting tongues 34. These tongues are of dovetailed form; that is, they enlarge toward their outer extremities, said outer extremities being cut on curved lines 35 which are struck from the pivot point 32 as a radius; that is, these edges are disposed circumferentially about the pivot point 32, and the side edges of the tongues are radially disposed with respect to the pivot points. In addition to this, the side edges of the tongues are beveled as indicated in Fig. 9. This figure, and also Fig. 8, further illustrate the mechanism now being described.

The body of the trip plate 31 is of substantially rectangular form, and its ends are provided with four guides 36, the said guides being disposed at the corners of the trip plate, as shown most clearly in Fig. 3. In these guides 36, pawls 37 are respectively mounted. These pawls consist of small blocks or sliding plates, and they are provided near their middle points with openings 38. These openings 38 receive the extremities of light wire springs 39 which are attached to the under side of the frame as indicated in Fig. 8. These springs tend to hold the pawls in an elevated position. The pawls normally project slightly below the lower ends of the guides, and their inner or adjacent edges are formed with notches 40 respectively, so that each pawl presents a vertically disposed shoulder 41. The lower edge 42 of each pawl is beveled or inclined as shown, so that the effect of a projecting tooth results at this point.

The inner upper edges or corners of the pawls 37 are provided with bevels or beveled edges 43. The trip plate is adapted to assume two positions; in one of these positions, one of the pawls is in an elevated position at one end of the plate, while the other pawl at the same end of the plate is in a depressed position. The swinging or rocking movement of the trip plate is such that when a certain pawl is in its elevated position, its beveled edge 43 engages with the beveled side edge of the tongue 34 at the end of the wing 33. In order to actuate the trip plate by means of

these pawls 37, the head 44 of the drum is enlarged so as to constitute a disk, and this disk is provided at a suitable point with a fixed dog 45. This dog describes a helix in the air as the drum advances and progresses along the feed screw. In its path the pawls may project, as indicated in Fig. 9. Referring to this figure, it will be evident that when struck by the dog, the trip plate will be moved toward the right. When this takes place, the movement is sufficient to bring the right-hand pawl beyond the edge of the wing 33, and it moves up into a position corresponding to that of the left-hand pawl shown in this view, which also moves out of the path of the dog. As the trip plate moves in this way, the beveled edge 43 of the formerly-elevated pawl coöperates with the beveled edge of the tongue 34 to depress this pawl into the position normally occupied by the right-hand pawl.

It should be understood that the disk or head 44 travels in the space between the ends of the trip plate 31, and when it arrives at one end, it throws the plate in one position, and at the other end, it throws it into an opposite position. In this connection, referring to Fig. 3, it will be apparent that if the pawl, indicated specifically by the numeral 37^a, is struck by the dog 45 so as to move the pawl rearwardly, that is, upwardly upon Fig. 3, the trip plate will be rocked toward the right so that the arm 30 will advance the cam plate 27 toward the right. The pawl 37^b will then move toward the front, or downwardly in Fig. 3, and will move to a depressed position. Through the medium of the cam slot 29, the advance of the cam plate 27 operates to throw over the slide 23. This follows from the fact that, coöperating with the cam slot 29, there is provided a pin or roller 46, as illustrated in Fig. 3, the said pin being attached to the under side of the frame plate 12 under which the cam plate slides. Thus it will be seen that the slot 28 simply operates as a guide so as to permit the cam plate to move in a horizontal plane. When the slide 23 is advanced as described, the arm 20 is rotated toward the right. This disengages the idle gear 21 from the detent 22, and brings it into mesh with the pinion 19. The continued rotation of the crank shaft continues to rotate the drum in the same direction as before, but the feed screw 14 is now given a movement through the medium of the pinion 19, idle gear 21, pinion 17 and the gear wheel 15. In this way the feed screw 14 is rotated in the same direction as the drum. This rotation is at an increased speed, so that the drum in rotating, will return along the screw toward the opposite end of its travel. It will be observed that the pawls 37^a and 37^b are diagonally opposite to each other. If the drum were rotated in a direction to unwind the cable, the dog 45 would coöperate with the two pawls 37^c and 37^d which are also disposed diagonally opposite to each other.

I provide brake mechanism which operates to allow the drum to rotate in a winding direction, but which automatically operates so as to resist and stop the rotation of the drum when unwinding. This mechanism is most clearly shown in Figs. 4, 5 and 7. It comprises a guide plate 47 which is attached rigidly to the side of the frame, as shown, the said guide plate presenting an outwardly projecting flange 48 which lies near the periphery of a brake disk 49, the said brake disk being rigidly attached upon the crank shaft or power shaft 6. The flange 48 is formed with a slot 50, as illustrated most clearly in Fig. 7, and this slot is wedge-shaped; that is, it is contracted toward its lower end.

Upon the shaft 6 on each side of the brake disk or wheel 49, arms 51 are loosely attached, and these arms near their outer extremities, are provided with shoes 52 having a large area and lying against the face of the wheel. Beyond the shoes 52 the arms 51 are formed into necks 53 which project through the slot 50. These necks are pulled toward each other by a small spring 54 as shown in Fig. 7. The ends of these arms, that is, the ends of the necks, are rounded on their outer sides, and substantially flat on their adjacent sides. On their upper edges they are notched so as to be engaged by a drag plate 55, the said drag plate being provided with a pair of large openings 56 through which the necks 53 may be passed. The lower edges of the necks 53 rest against the lower edges of the openings 56. The drag plate 55 is formed upon the end of a brake rod 57, which rod extends downwardly in an inclined direction, its lower end being pivotally attached to a brake cam 58. This cam is pivoted at 59 and has a cam toe 60 which projects downwardly. Pivotally mounted near the cam toe I provide a releasing lever 61, which is normally held by a spring 62 in a position remote from the cam 58.

From the end of the lever 61 a ring 63 is suspended, and if this ring is pulled downwardly, the lever 61 will rotate downwardly and come into engagement with the toe 60. In doing so, it will force the cam 58 into the position shown in Fig. 4; that is, it will push the brake rod 57 upwardly. In this way the brake arms 51 are moved so that the shoes 53 are disposed in the upper end of the slot 50. The slot 50 is proportioned so that when the shoes are in this position, they will not engage the brake wheel 49 with any force. The direction of rotation of the brake wheel 49 for the winding on movement of the drum, is that which is indicated by the arrow in Fig. 4; hence, the tendency of the friction exerted by the wheel 49 upon the brake shoes, is to hold the brake shoes at the wide end of

the slot. When an unwinding movement begins, the friction tends to push the brake shoes downwardly, carrying the necks 53 downwardly in the slot 50. In this way the edges of the slot which engage the outer faces of the necks, jam them with great force against the wheel, and prevent its further rotation. Thus, it will be seen that an automatic brake is provided, which becomes applied at once upon the reversing or unwinding movement of the drum. The brake, of course, may be released by pulling down the releasing lever 61 until it engages the cam as suggested.

The crank 16 is attached in such a way that it may be readily thrown out of operative connection with the crank shaft 6. For this purpose, on the projecting extremity of the crank shaft 6, a loose collar 64 is attached, and to the side of this collar the crank 16 is pivotally attached, the crank being provided with an offset ear 65, as illustrated in Fig. 2. The end of the shaft 6 is formed into a transversely elongated flat tongue 66. In the hub 67 of the crank a rectangular opening 68 is formed, which fits this tongue 66, so that the crank may engage with the shaft as illustrated. If it is desired to disengage the crank from the shaft, it is only necessary to rotate it toward the left, as viewed in Fig. 2, the rotation taking place about the pivotal connection between the crank and the collar. In this way the hub 67 of the crank becomes detached from the tongue, and the crank will be allowed to hang down from the collar 64. In descending to a considerable distance, the crank would be disconnected in the manner described, so as to enable the crank shaft to rotate without rotating the crank.

The mode of operation of the machine will now be described: The workman or operator of the machine sits upon the seat 5 with the belt 3 passing around the upper portion of his body. He then operates the crank 16 with his right hand and controls the brake with his left hand by means of the ring 63. The rotation of the crank shaft 6 is imparted to the drum 9. Supposing that the feed screw 14 is held fixed by the detent 22, the rotation of the drum will operate to advance it along the screw. When the drum arrives near the limit of its travel in this direction, the dog 45 carried by the drum head 44, will strike against one of the pawls of the trip plate and throw the trip plate to the opposite position. Through the medium of the cam plate 27, the trip plate operates to throw in the mechanism for driving the feed screw, and the feed screw is then rotated in the same direction as the drum, but at twice the angular velocity thereof. This operates to draw the drum toward the opposite end of its travel, reversing its movement. The pitch of the thread of the drum is such that this operation results in maintaining the winding point of the drum constantly in line with the pulley 13.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. In mechanism of the class described, in combination, a frame, a feed screw mounted therein, a drum rotatably mounted on said feed screw and adapted to be advanced by the thread thereof, means for rotating said drum, and means for intermittently rotating said feed screw, whereby said drum travels to and fro upon said feed screw.

2. In mechanism of the class described, in combination, a frame, a drum rotatably mounted therein and adapted to receive a cable, said drum having a head with a dog attached thereto, means for advancing said drum longitudinally as it rotates, and mechanism actuated by said dog for reversing the direction of longitudinal movement of said drum.

3. In mechanism of the class described, in combination, a frame, a drum rotatably mounted in said frame, means for advancing said drum longitudinally as it rotates, a dog carried by said drum, a trip plate adapted to be engaged by said dog, and mechanism actuated by said trip plate for reversing the longitudinal movement of said drum.

4. In mechanism of the class described, in combination, a frame, a feed screw mounted therein, a drum rotatably mounted on said feed screw, means for rotating said drum, mechanism for driving said feed screw, and automatic means for throwing said last mechanism in and out of connection with said feed screw.

5. In mechanism of the class described, in combination, a frame, a feed screw, means for normally holding said feed screw fixed against rotation, a drum rotatably mounted on said feed screw, means for rotating said drum, mechanism for rotating said feed screw, and automatic means for connecting and disconnecting said last mechanism with and from said feed screw.

6. In a machine of the class described, in combination, a frame, a feed screw mounted therein, a drum rotatably mounted on said feed screw, means for rotating said drum, a gear wheel carried by said feed screw, a movable gear adapted to drive said gear wheel, and automatic means for moving said movable gear to disconnect or connect said feed screw.

7. In a machine of the class described, in combination, a frame, a drum rotatably mounted therein and adapted to travel to and fro longitudinally, a pivotally mounted trip plate having pawls, a dog carried by said drum and adapted to engage said pawls, and means actuated by said trip plate for controlling the travel of said drum.

8. In a machine of the class described, in combination, a frame, a feed screw mounted therein, a drum rotatably mounted on said feed screw and receiving a longitudinal travel from the thread of said screw, a pinion adapted to rotate when said drum rotates, a gear wheel carried by said feed screw, a movable gear adapted to mesh with said pinion and adapted to transmit the rotation thereof to said first gear wheel, a trip plate mounted on said frame, means carried by said drum for actuating said trip plate, and a connection from said trip plate to said movable gear for engaging or disengaging said movable gear with and from said pinion.

9. In a machine of the class described, in combination, a frame, a feed screw mounted therein, a drum rotatably mounted on said feed screw, means for rotating said drum, a trip plate pivotally mounted on said frame and having pawls for reversing the position thereof, means carried by said drum for engaging said pawls to actuate said trip plate, and mechanism actuated by said trip plate for intermittently driving said feed screw.

10. In a machine of the class described, in combination, a frame, a feed screw mounted therein, a drum rotatably mounted on said feed screw, means for rotating said drum, a trip plate pivotally mounted on said frame and having pawls for reversing the position thereof, means carried by said drum for engaging said pawls to actuate said trip plate, mechanism actuated by said trip plate for intermittently driving said feed screw, and means for intermittently holding said feed screw fixed.

11. In a machine of the class described, in combination, a frame, a feed screw mounted therein, a drum rotatably mounted on said feed screw, a shaft for rotating said drum, a pinion carried by said shaft, a gear wheel rigid with said feed screw, a pinion meshing with said gear wheel, an arm pivotally mounted coaxially with said last pinion, an idle gear carried by said arm and adapted to mesh with said first pinion, and automatic means for actuating said arm to throw said idle gear in or out of mesh with said first pinion.

12. In a machine of the class described, in combination, a frame, a feed screw mounted therein, a drum rotatably mounted on said feed screw, a shaft for rotating said drum, a pinion carried by said shaft, a gear wheel rigid with said feed screw, a pinion meshing with said gear wheel, an arm pivotally mounted coaxially with said last pinion, an idle gear carried by said arm and adapted to mesh with said first pinion, automatic means for actuating said arm to throw said idle gear in or out of mesh with said first pinion, and a detent engaging said idle gear when out of engagement with said first pinion.

13. In a machine of the class described, in combination, a frame, a drum rotatably mounted therein, means for rotating said drum, means for imparting a longitudinal travel to said drum, a wing plate, a trip plate pivotally mounted on said wing plate, movable pawls mounted in said trip plate and having advanced or withdrawn positions depending upon the position of said trip plate, means carried by said drum for engaging said pawls to reverse said trip plate, and means actuated by said trip plate for actuating said feed screw.

14. In a machine of the class described, in combination, a frame, a feed screw mounted therein, a drum rotatably mounted on said feed screw, a wing plate, a trip plate mounted on said wing plate, movable pawls carried by said trip plate and having beveled upper edges coöperating with said wing plate to advance said pawls, resilient means tending to withdraw said pawls, means carried by said drum and engaging said pawls to operate said trip plate, and means actuated by said trip plate for rotating said feed screw.

15. In a machine of the class described, in combination, a frame, a drum rotatably mounted in said frame, means for giving said drum a longitudinal travel, a wing plate, a trip plate pivotally mounted on said wing plate and having movable pawls, resilient means tending to maintain said pawls in a withdrawn position, said wing plate and said trip plate having beveled edges coöperating to advance said pawls when said trip plate is rotated, means moving with said drum to engage said pawls for actuating said trip plate, and means actuated by said trip plate for reversing the traveling movement of said drum.

16. In a machine of the class described, in combination, a frame, a feed screw mounted therein, a gear wheel rigid with said feed screw, a drum rotatably mounted on said feed screw, a gear wheel carried thereby, a crank shaft having an elongated pinion meshing with said second gear wheel, a second pinion carried by said crank shaft, a trip plate, means for actuating said trip plate automatically from said drum, and mechanism connecting said trip plate with said pinion for driving said first gear wheel to rotate said screw.

17. In a machine of the class described, in combination, a drum adapted to receive a cable, a brake wheel adapted to rotate with said drum, arms pivotally mounted on the axis of said brake wheel, having shoes engaging the sides of said brake wheel, and means tending to force said arms together, controlled by the direction of rotation of said brake wheel.

18. In a machine of the class described, in combination, a drum adapted to receive a cable, a brake wheel rotating with said drum, a bracket disposed adjacent to the edge of said brake wheel and having a tapered open-

ing therein, brake shoes guided by said opening and disposed on each side of said brake wheel, and means for maintaining a light pressure of said brake shoes on said wheel, whereby the friction of movement between said wheel and said shoes may jam said shoes in said tapered opening to apply the braking pressure to said wheel.

19. In a machine of the class described, in combination, a drum adapted to receive a cable, a brake wheel rotating with said drum, a bracket disposed adjacent to the edge of said brake wheel and having a tapered opening therein, brake shoes guided by said opening and disposed on each side of said brake wheel, means for maintaining a light pressure of said brake shoes on said wheel, whereby the friction of movement between said wheel and said shoes may jam said shoes in said tapered opening to apply the braking pressure to said wheel, and means for releasing said shoes.

20. In a machine of the class described, in combination, a drum adapted to have a cable wrapped thereupon, a brake wheel rotating with said drum, a bracket having a tapered opening lying adjacent to the edge of said wheel, brake shoes having necks projecting through said tapered opening and engaging the edge thereof, whereby a movement of said shoes on one end of said opening may jam said shoes against said brake wheel, and means for maintaining a slight pressure of said brake shoes on said wheel.

21. In a machine of the class described, in combination, a frame, a drum rotatably mounted in said frame and adapted to receive a cable, a brake wheel rotating with said drum, a bracket carried by said frame, having a tapered opening therein lying near said brake wheel, arms pivotally mounted on the axis of said wheel having shoes adapted to press the faces of said wheel, and having necks projecting through said tapered opening and engaging the edges of said opening, means for maintaining a light pressure of said shoes on said brake wheel, whereby a rotation of said wheel in one direction may apply the brakes by forcing said necks toward the contracted part of said opening, and a brake rod connected with said necks for releasing the brake shoes.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

EMIL G. GEBAUER.

Witnesses:
THOMAS S. CONROY,
BERNHARD TOWNIER.