

Sept. 2, 1958

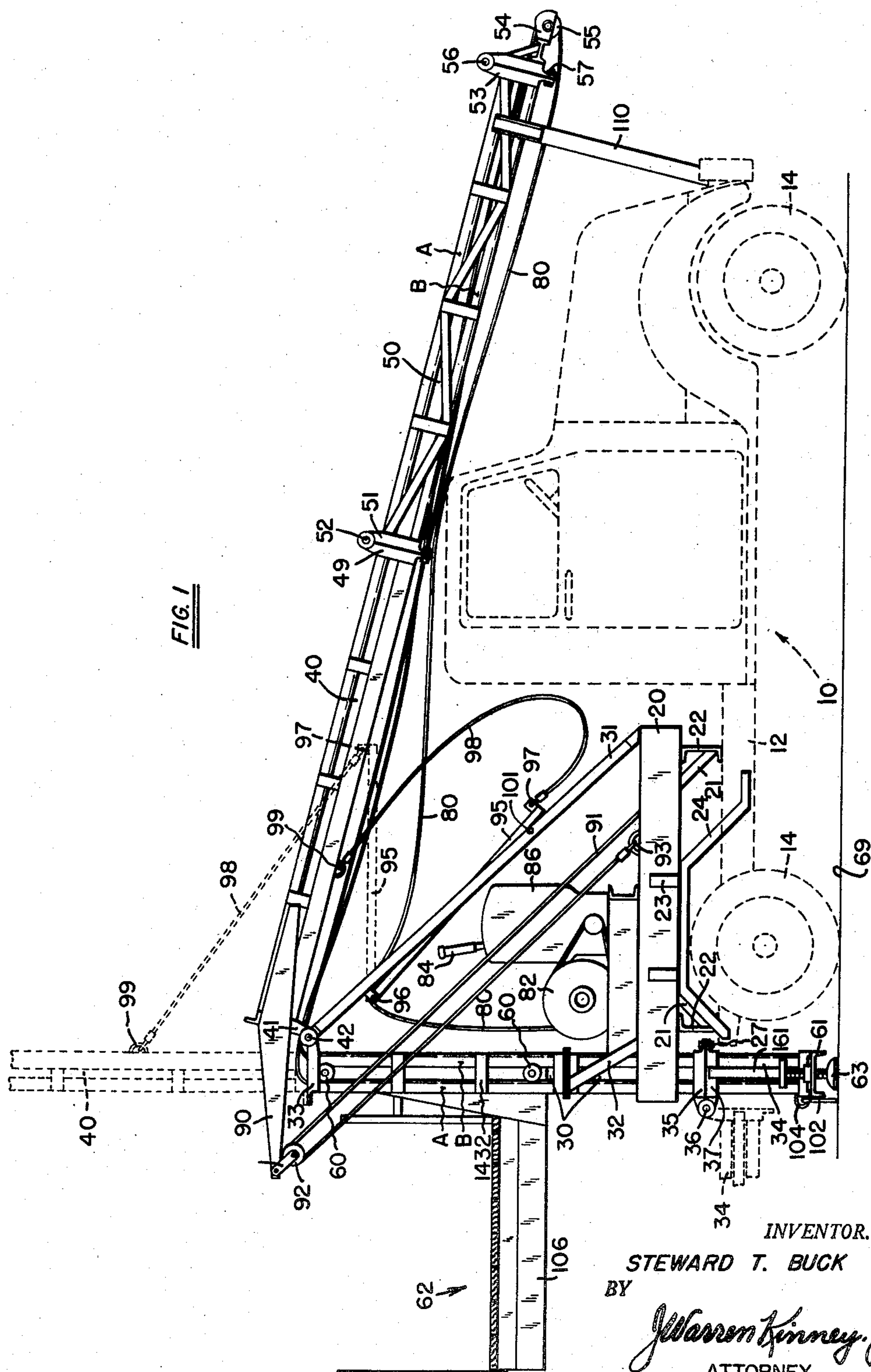
S. T. BUCK

2,850,191

PORTABLE ELEVATOR TOWER

Filed March 20, 1956

5 Sheets-Sheet 1



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PORTABLE ELEVATOR TOWER

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FIG. 3

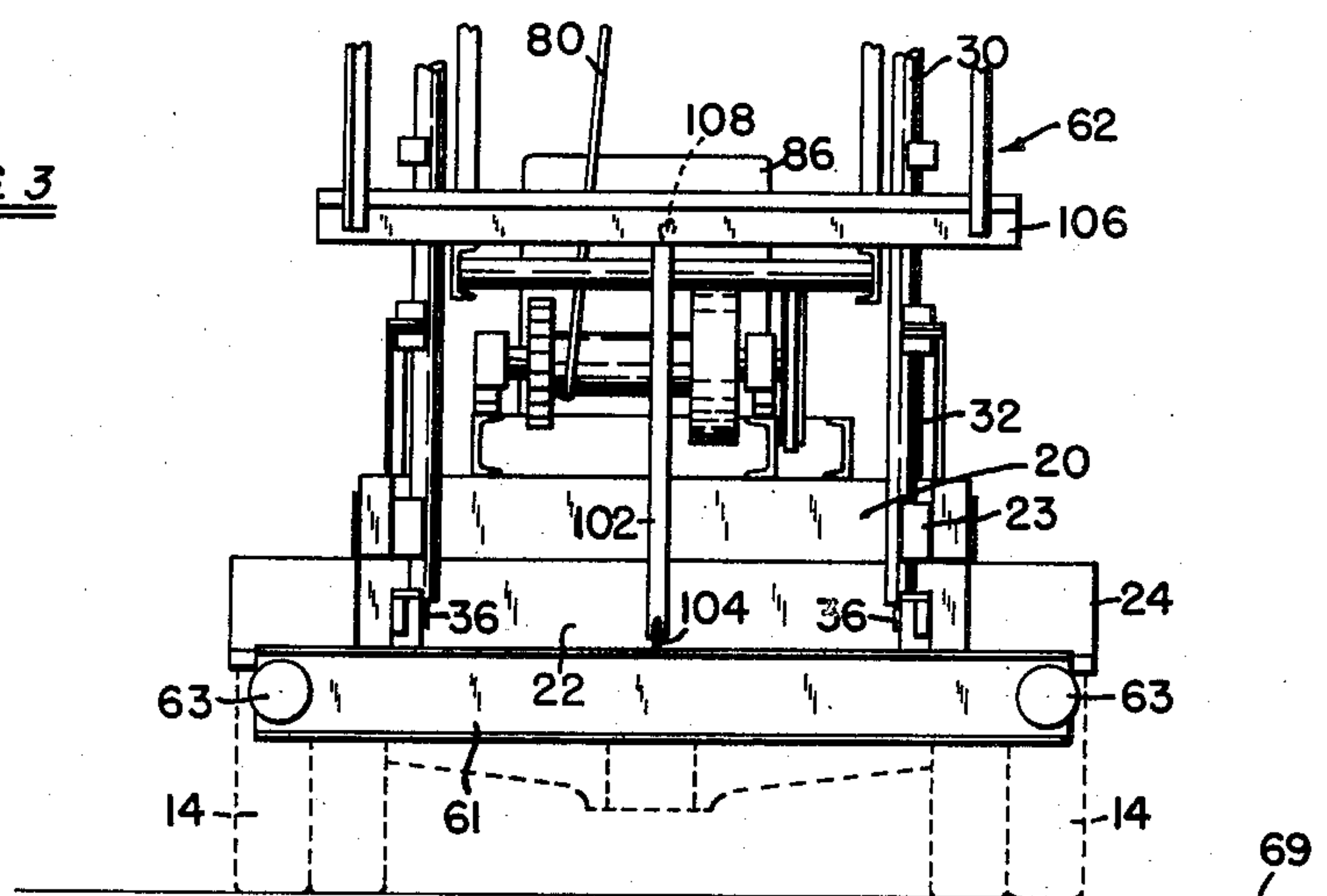
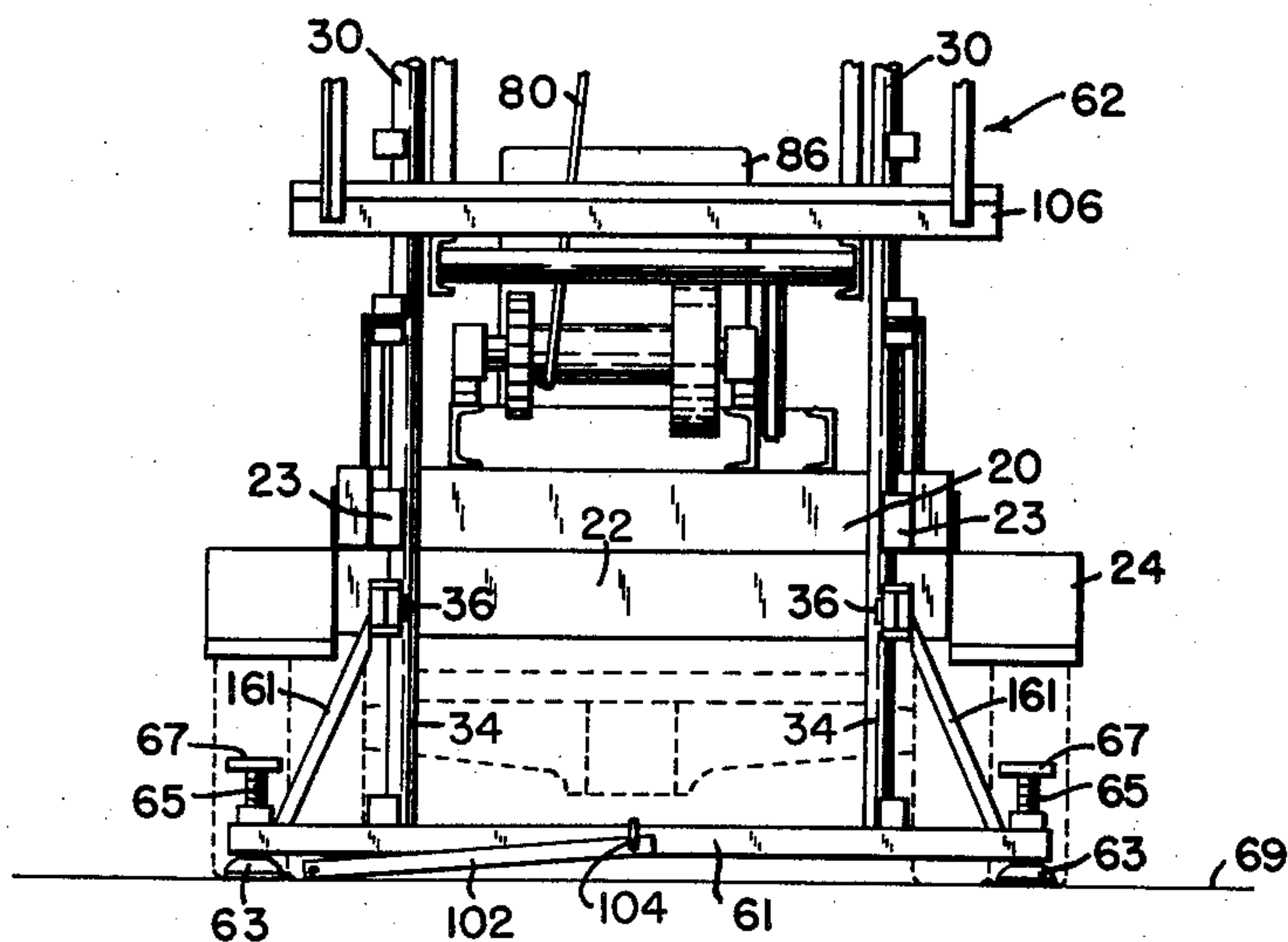


FIG. 2



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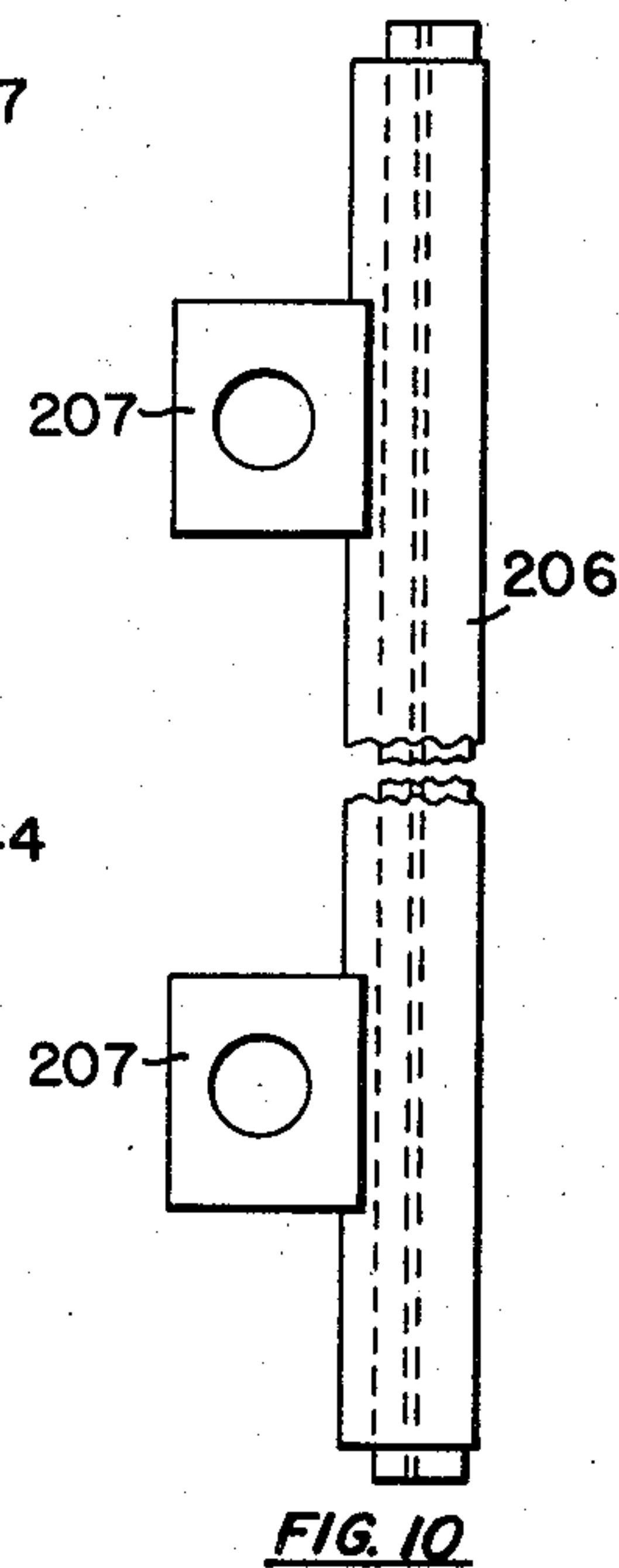
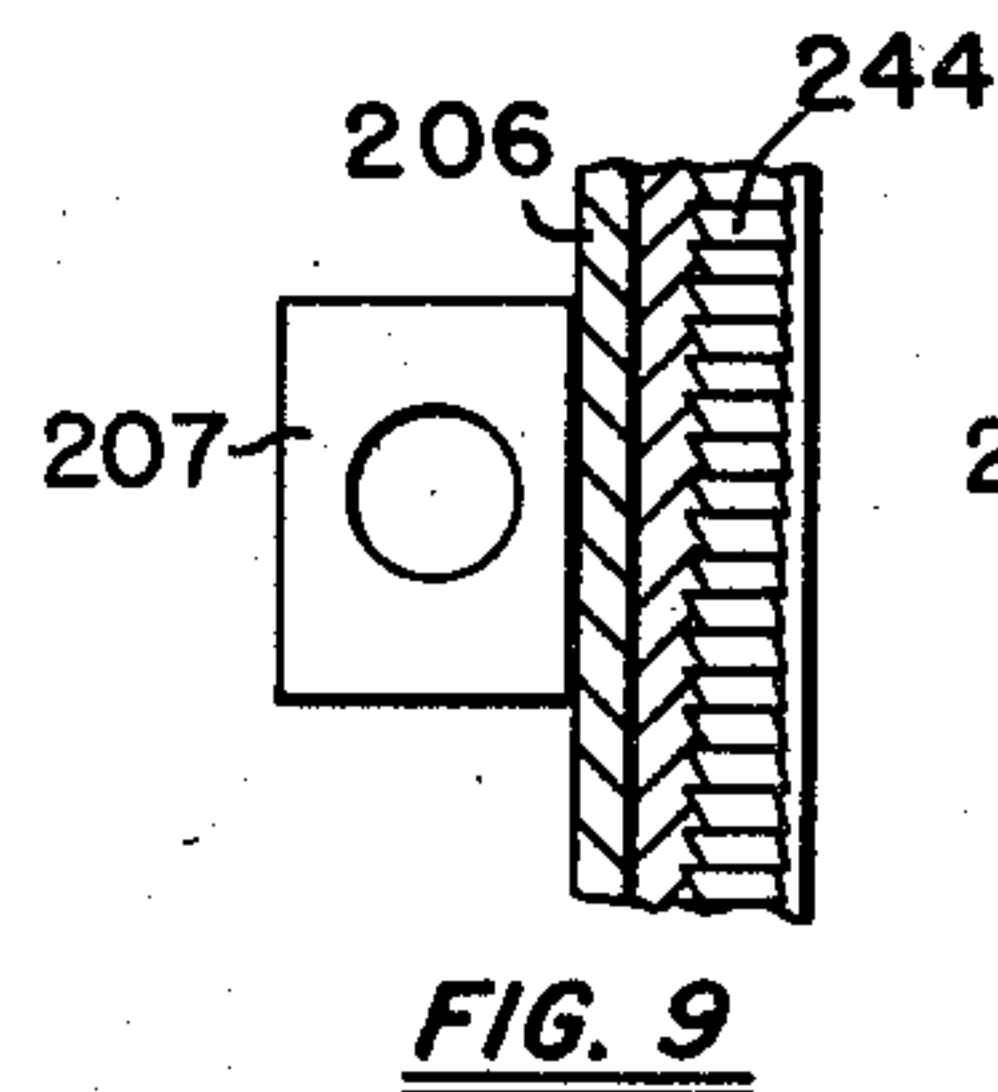
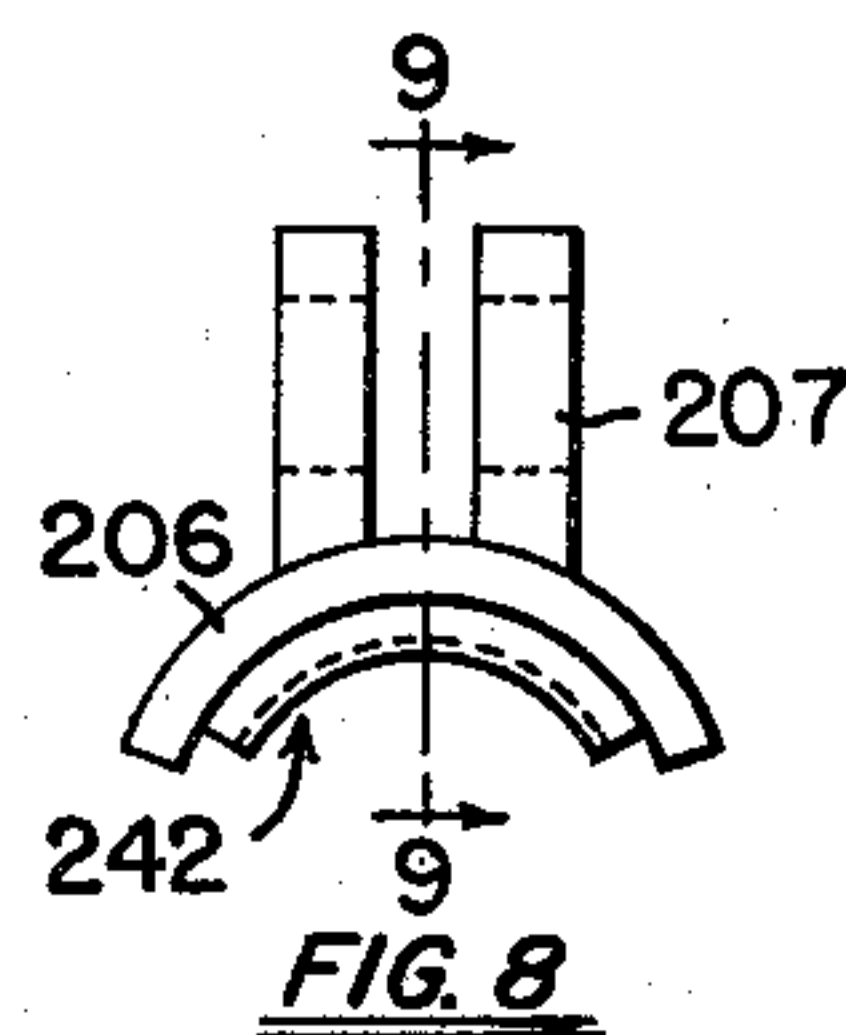
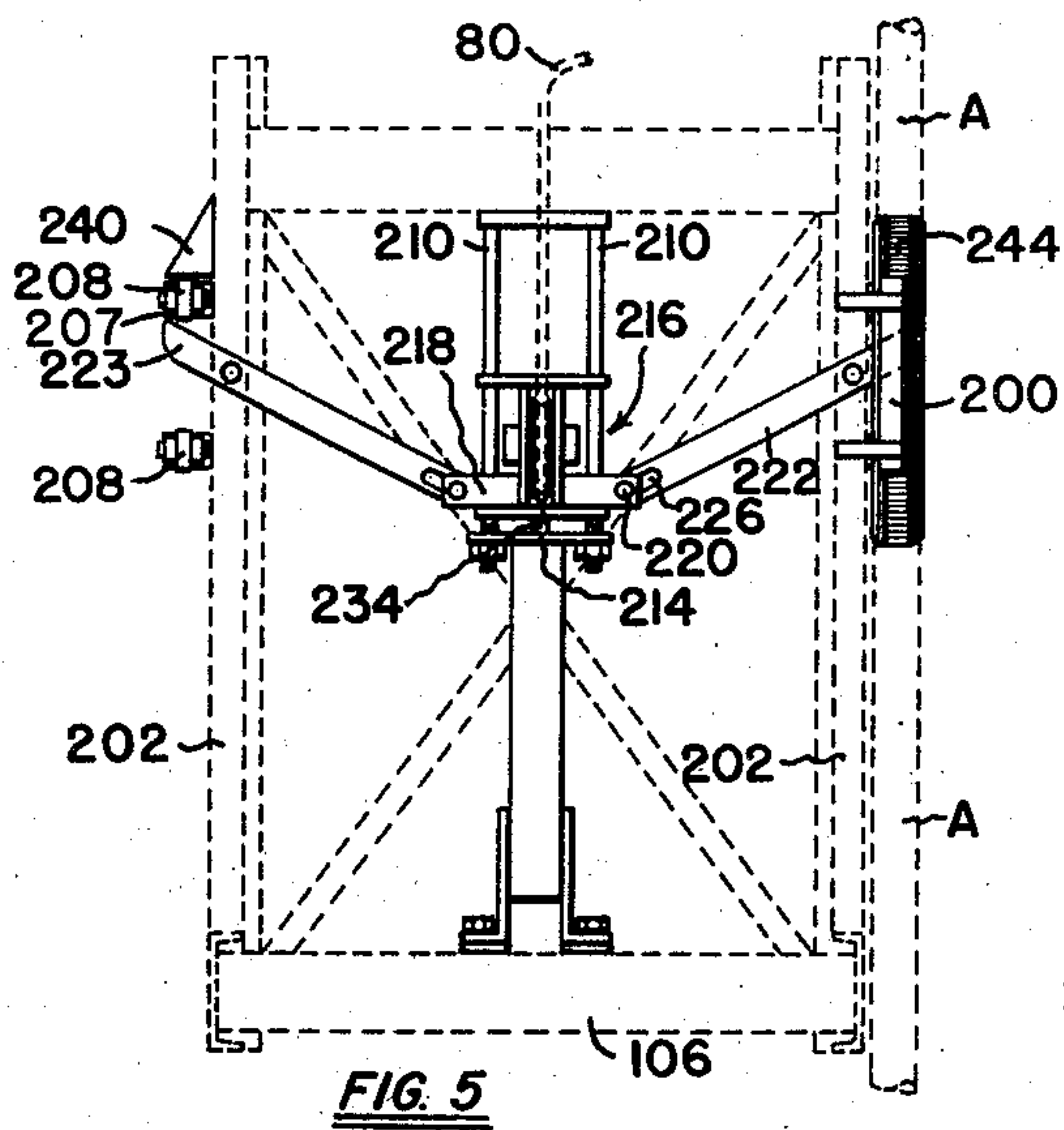
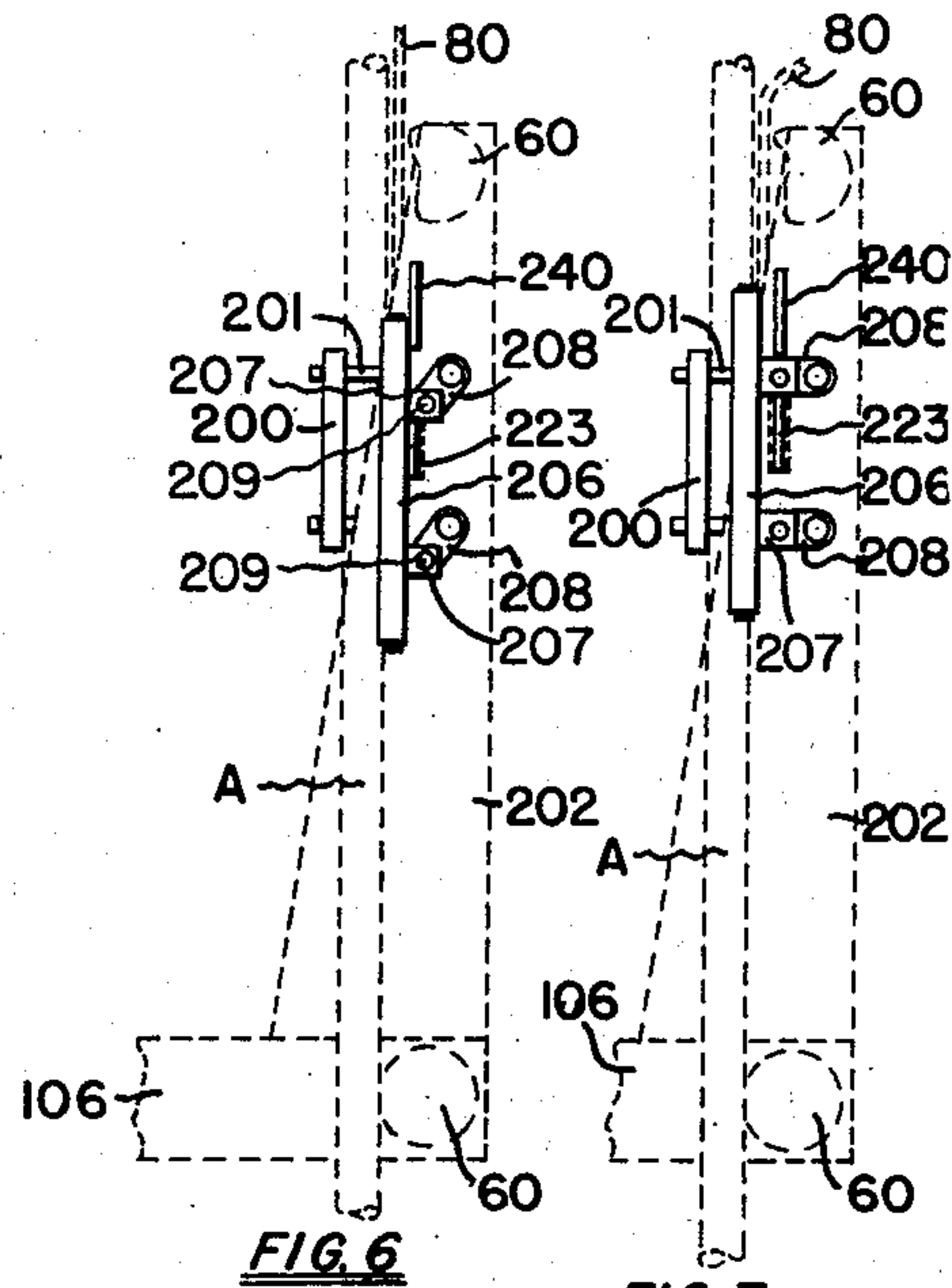
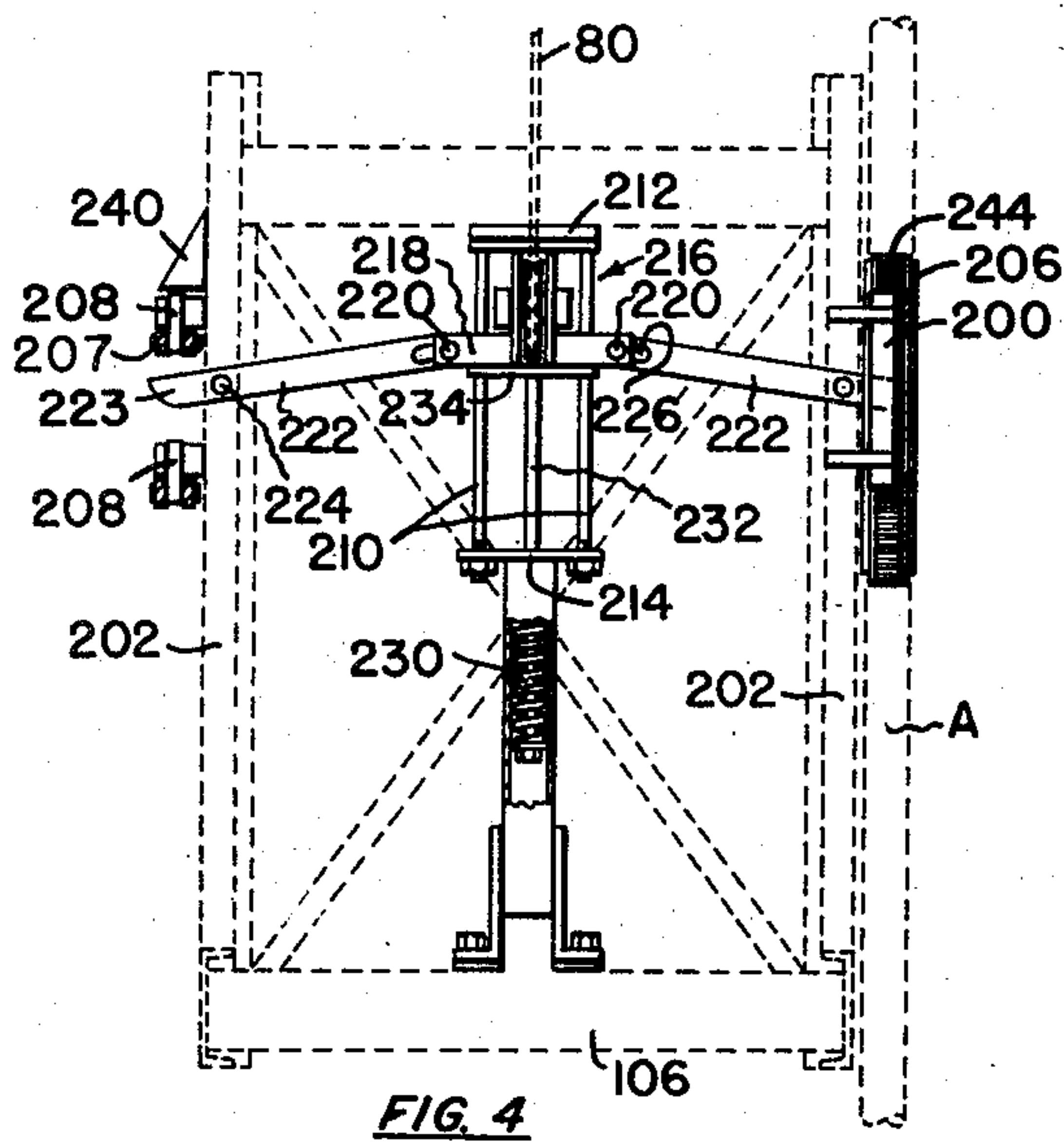
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PORTABLE ELEVATOR TOWER

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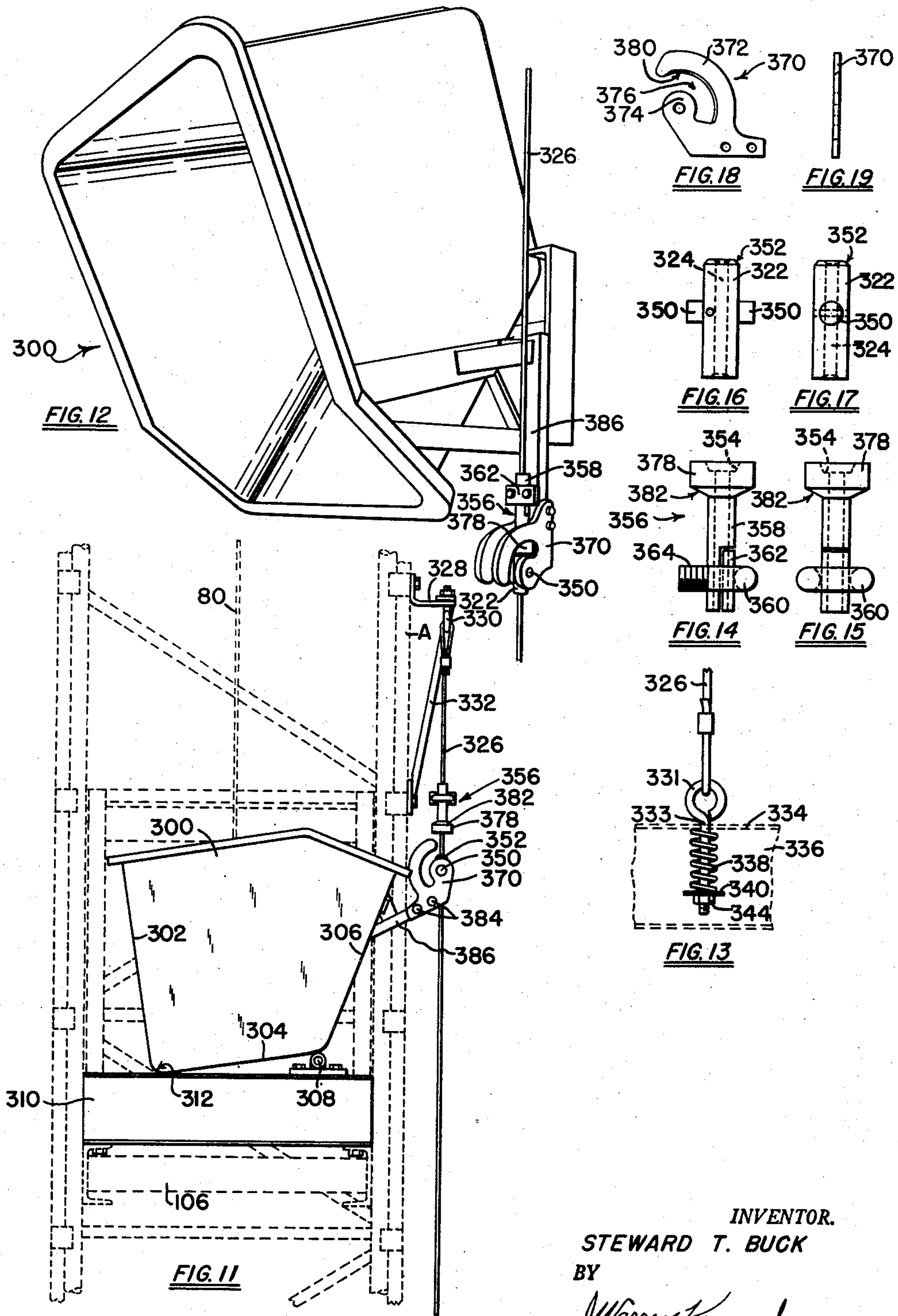
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PORTABLE ELEVATOR TOWER

Filed March 20, 1956

5 Sheets-Sheet 4



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PORTABLE ELEVATOR TOWER

Filed March 20, 1956

5 Sheets-Sheet 5

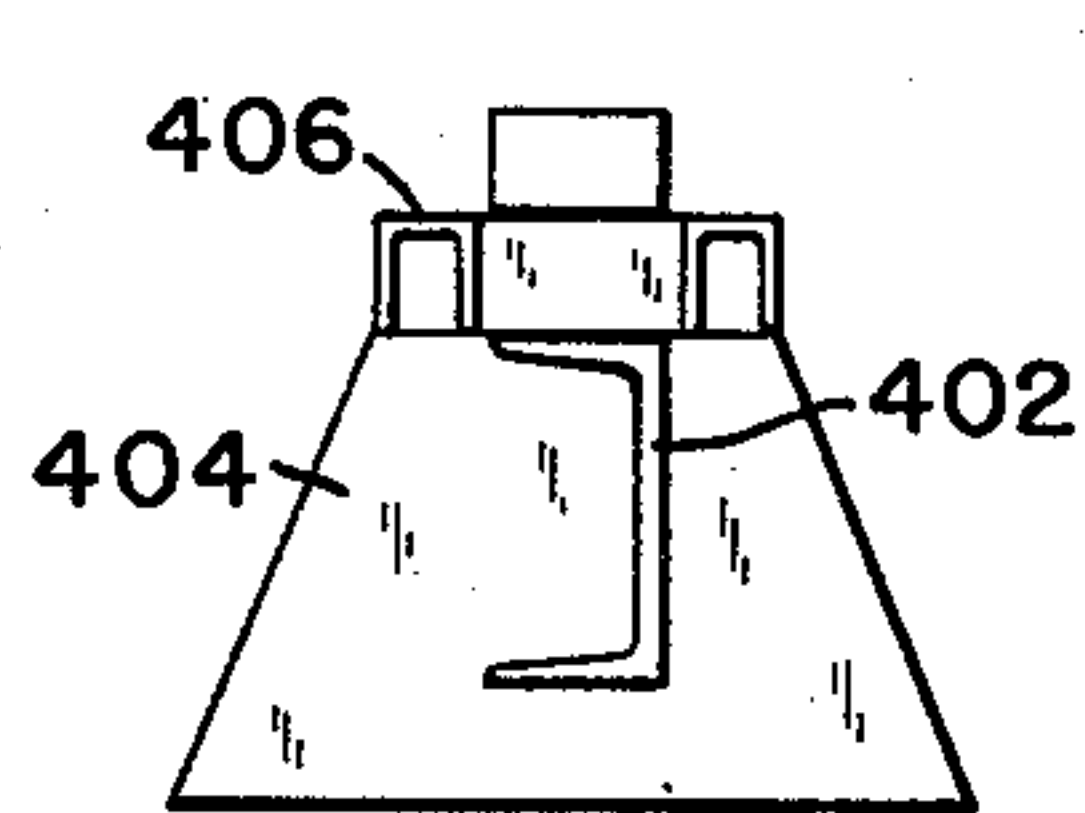
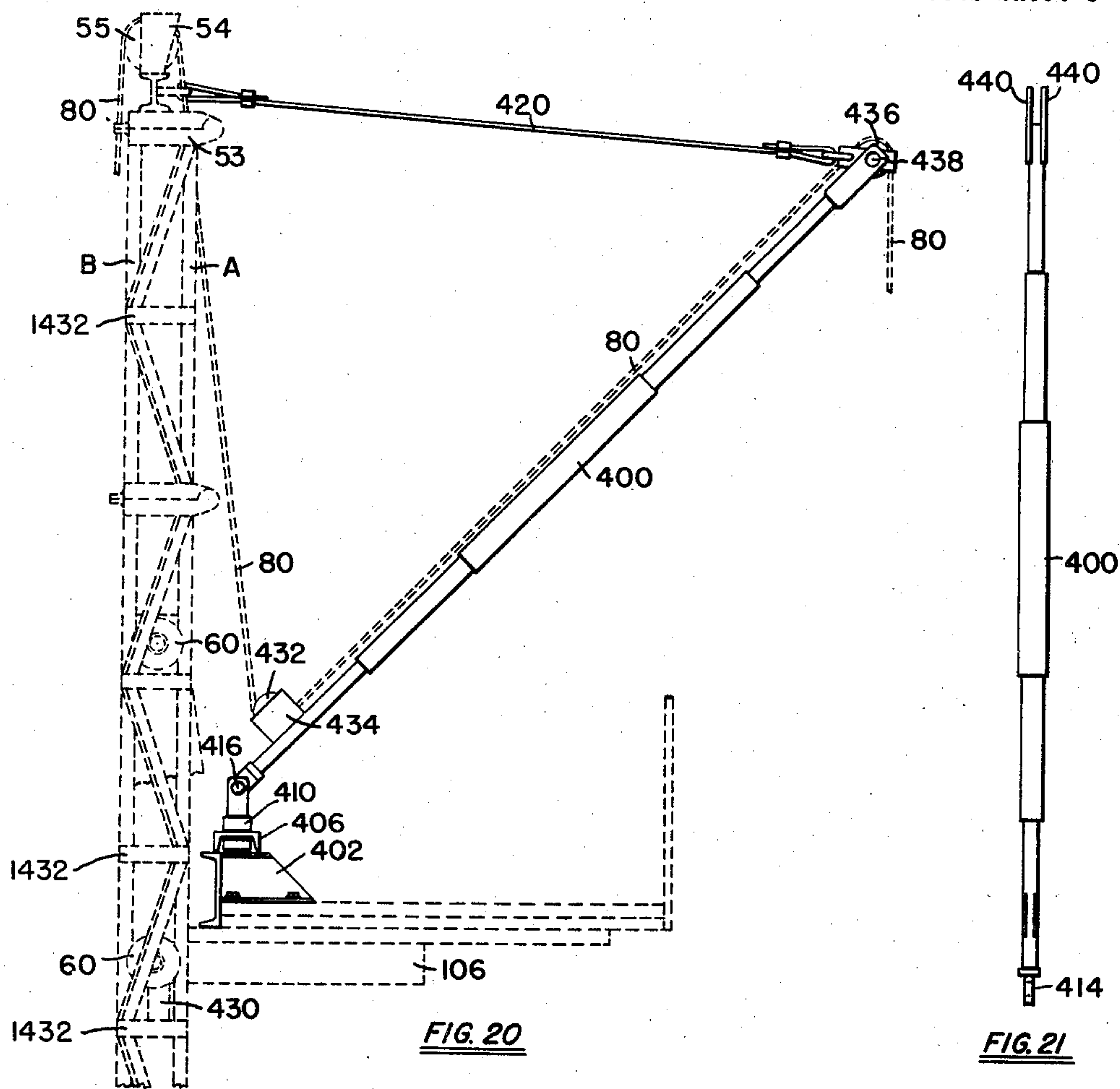


FIG. 22

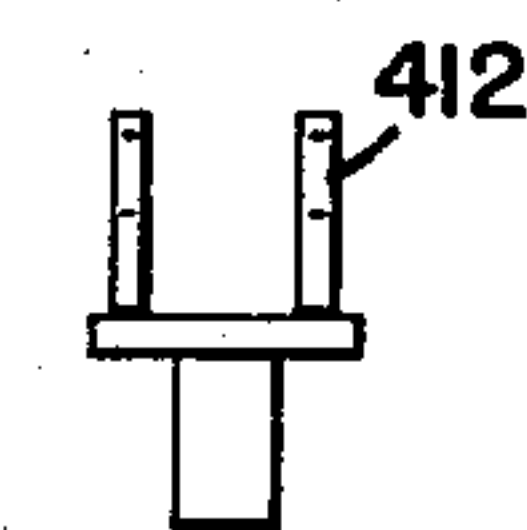


FIG. 23

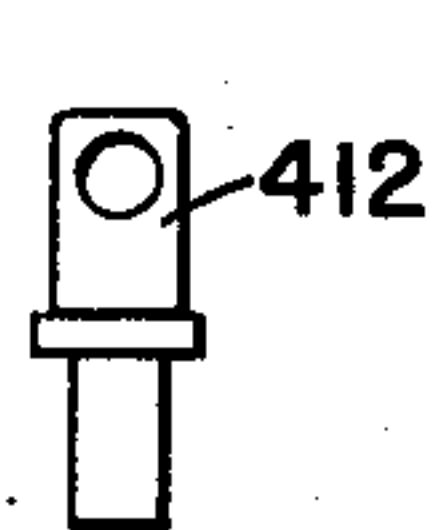


FIG. 24

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2,850,191

PORTABLE ELEVATOR TOWER

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Application March 20, 1956, Serial No. 572,688

5 Claims. (Cl. 214—630)

This invention relates to a portable hoisting tower assembly, and more particularly to a sectional hoisting tower having a platform elevator operably associated therewith.

An object of the invention is to provide a sectional hoisting tower assembly in conjunction with a wheel-supported transport vehicle for enabling the tower to be conveniently moved from one location to another.

Another object of the invention is to provide a sectional hoisting tower in conjunction with a wheel-supported transport vehicle wherein the tower comprises a lower section which is selectively movable between a lowered position in axial alignment with other portions of the tower, and in which position the said lower tower section will be ground-engaging for thereby supporting the weight of the tower structure; the said lower portion being shiftable to a raised, inoperative position during transport of the tower and vehicle.

A further object of the invention is to provide a portable hoisting tower assembly having the hereinabove described characteristics and which includes elevator actuating means which are secured to and carried by the transport vehicle, said elevator actuating means being provided with a protective roof which is automatically raised to an operator-protecting position incident to erection of the tower assembly.

Still another object of the invention is to provide a portable hoisting tower having an elevator operably associated therewith in connection with a wheel-supported transport vehicle, with a lower tower section which when fully lowered provides a vertical extension for the tower elevator, thereby enabling the elevator to be lowered to ground level for loading and unloading operations; thereby avoiding the necessity of providing means for bodily raising and lowering the entire tower-supporting base as disclosed in my Patent No. 2,653,685 dated September 29, 1953.

Still a further object of the invention is to provide a portable hoisting tower which, when in a collapsed position, will compactly approximate the overall confines of the transport vehicle to which it is mounted, thereby providing a mobile unit which may be conveniently driven on the public highway, under bridges and the like, without requiring dismantling of the tower structure.

Another object of the invention is to provide the elevator of a hoisting tower assembly with fully automatic elevator supporting safety means which are automatically rendered operable in the event the supporting cables should break or become slack.

Still another object of the invention is to provide a dump bucket attachment for the elevator platform of a hoisting tower.

A further object of the invention is to provide adjustable means for automatically dumping an elevator supported dump bucket when it reaches a predetermined location on the hoisting tower, said means automatically righting the bucket incident to its being lowered from said location.

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Another object of the invention is to provide a hoisting boom attachment for the elevator of a hoisting tower for providing a platform derrick wherein the elevator hoisting cable is utilized as the lifting cable of the derrick.

These and other objects are attained by the means described herein and as disclosed in the accompanying drawings, in which:

Fig. 1 is a side elevation of a mobile portable hoisting tower embodying the teachings of the present invention in a fully collapsed or retracted transport position.

Fig. 2 is an end view of the lower portion only of device of Fig. 1.

Fig. 3 is an end view similar to Fig. 2, but illustrating the lower tower section in a fully elevated, inoperative, transport position.

Figs. 4 and 5 are front views of the safety device comprising a detail of the present invention with parts thereof broken away and with the elevator and hoisting tower indicated in broken outline, for clarity of detail and understanding, showing the device in normal inoperative and operative positions, respectively.

Figs. 6 and 7 are side views of Figs. 4 and 5, respectively.

Fig. 8 is a top elevational view of a brake shoe comprising a detail of the invention.

Fig. 9 is a sectional view taken on line 9—9 of Fig. 8.

Fig. 10 is a side elevational view of the brake shoe of Fig. 8.

Fig. 11 is a side elevational view of a dump bucket assembly comprising a detail of the invention.

Fig. 12 is a perspective view of the bucket of Fig. 11 in dumping position.

Fig. 13 is a side view of the lower end of cable 326 of Fig. 11.

Fig. 14 is a rear elevational view of the adjustable cable stop comprising a detail of the invention.

Fig. 15 is a side elevational view of Fig. 14.

Fig. 16 is a rear elevational view of the cable sleeve comprising a detail of the invention.

Fig. 17 is a side elevational view of Fig. 16.

Fig. 18 is a side elevational view of the one of the bucket actuators comprising a detail of the invention.

Fig. 19 is a rear elevational view of Fig. 18.

Fig. 20 is a side elevational view of a hoisting boom assembly comprising a detail of the invention.

Fig. 21 is a front elevational view of the boom of Fig. 20.

Fig. 22 is a front view of the boom support.

Fig. 23 is a front view of the boom mount.

Fig. 24 is a side elevational view of Fig. 23.

With reference to Fig. 1, the numeral 10 denotes generally a transport vehicle which includes a framework 12 suitably supported upon road engaging wheels 14.

It should be understood that the present invention is neither directed to nor concerned with the particular type of transport vehicle, which therefore has been illustrated in the drawings in broken outline.

A base 20 is fixedly secured to frame 12 by means of channels 22 and structural elements 21, whereby base 20 will, in effect, comprise an integral part of frame 12.

The numeral 24 denotes generally a fender suspended from supports 23.

A sectional tower is secured to and carried by base 20, and in the preferred embodiment of the invention the tower comprises a first section 30 which is secured to and in fixed, rigid, upstanding relationship with the rear end of base 20 such as by means of brace elements 31 and 32. Hinge plates 33 and 35 are permanently secured to the upper and lower ends, respectively, of the first tower section, and a second or base section 34 having a hinge plate 37 at its upper end is pivotally secured as at 36 to

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the lower end of section 30 for movement between the fully lowered position illustrated in solid outline in Fig. 1, in axial alignment with section 30, and the elevated, inoperative position extending rearwardly of base 20 and section 30, as indicated in broken outline in Fig. 1. When in lowered position tower section 34 is securely though releasably anchored to section 30 such as by means of a bolt 27 which extends through hinge plates 35 and 37.

The tower likewise may include a third section 40 the lower end of which is provided with a hinge plate 41 pivoted as at 42 to hinge plate 33 on the upper end of the first section 30; and a fourth section 50 having hinge plate 51 at its lower end is pivotally secured as at 52 to hinge plate 49 at the upper end of section 40. If desired, a cat-head assembly 54 including a pulley 55 may be pivotally connected by pintle 56 and bolt 57 to hinge plate 58 secured to and carried by the free upper end of section 50.

Each of the various tower sections, 30, 34, 40 and 50, is provided with a pair of laterally spaced, elongate track-defining elements A and B between which wheels 60 of an elevator assembly denoted generally by the numeral 62 are received for endwise movement therebetween.

Pulley 55 of the cat-head assembly guides an elevator control or lift cable 80, one end of which is secured to elevator drum 82 which is adapted to be selectively driven in opposite directions and/or locked against rotation by means of manual manipulation of control lever 84 of a suitable power source denoted generally by the numeral 86. The other end of cable 80 is operatively secured to the elevator 62.

A tower lever 90 is fixedly secured to the lower end of tower section 40, said lever projecting a substantial distance beyond and at the sides of said tower section. Suitable means, such as, by way of example, a pulley 92, is secured to the free outer end of lever 90 to permit the application of a tower elevating force to the lever for swinging sections 40 and 50 from the lowered positions indicated in solid outline to their fully erected, vertical positions denoted in broken outline, in axial alignment with tower section 30 incident to a reeling in of cable 91 by means of a suitable winch, not illustrated. The free end of the cable may be anchored to the base as at 93.

With particular reference now to Figs. 1 and 2, it will be noted that the lower ends of tower sections 34 terminate in a transverse foot-member 61 the outer ends of which, note Fig. 2, are spaced outwardly from the sides of the tower sections. Adjustable ground-engaging means comprising ground-engaging plates 63, secured to and carried by the lower ends of shaft 65 of a jack screw mechanism, including a hand-wheel 67, are provided at opposite ends of member 61 for thereby enabling an operator to selectively effect a firm engagement with a supporting surface 69 such as the ground, or the like. The numerals 161 of Figs. 1 and 2 denote transverse brace members which rigidly interconnect hinge plates 37 and member 61.

With reference to Figs. 1 and 2, it will be noted that the lower tower section will thus support the weight of the upper portions of the tower, the weight of which will thereby be removed from the wheeled vehicle.

When it is desired to move the device from one location to another, the upper tower sections 40 and 50 will be lowered, it being noted that elevator 62 is first securely though releasably anchored relative to the fixed tower section 30. Then, after the upper tower sections have been lowered and secured to brace member 110, Fig. 1, the jack screws may be released for freeing the lower tower section 34, which may then be swung upwardly to the inoperative position of Fig. 3, in which condition it may be securely though releasably anchored by means of a connector element 102 the lower end of which is connected as at 104 to a portion of transverse element 61, the upper end thereof being secured as at 108 to a portion of elevator platform 106.

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With reference again to Fig. 1, the numeral 95 denotes generally a roof panel pivotally secured at 96 to brace member 31 for movement between the fully lowered, inoperative position indicated in solid outline to the fully elevated, operative position indicated in broken outline. The free end of said panel is connected at 97 to a cable 98 which is secured to tower section 40 as at 99 whereby elevation of the tower will automatically raise the panel to a substantially horizontal position above and over the power plant 86 and that portion of base 20 on which the elevator operator sits or stands. A stop pin 101 will limit the lowered position of said panel.

From the foregoing it will be noted that I have thus provided a portable hoisting tower in association with a transport vehicle and the weight of which tower, when fully erected, will be sustained by the ground, or other supporting surface, through the lowermost section of the tower, and be relieved entirely from the transport vehicle.

With reference now to Figs. 4 through 7, the numerals 200 denote pressure plates rigidly secured by brackets 201 to the upstanding side members 202 of the elevator assembly 62, whereby they will be disposed in closely spaced parallelism or in actual light, sliding relationship with the forward face of the vertical elevator-track or elevator guide defining elements A.

The numerals 206 denote elongate brake shoes pivotally secured by parallel links 208 to side members 202 for movement between the normal, inoperative positions of Figs. 4 and 6, in spaced relationship with the rear face of track or guide elements A, to the operative positions of Figs. 5 and 7, in positive locking engagement with said elements.

The brake shoes are automatically shifted from inoperative to operative positions, should the elevator supporting cable 80 break or become slack.

With particular reference now to Figs. 4 and 5, the numerals 210 denote vertical guide elements spanning horizontal plates 212 and 214 and upon which pulley cage 216 is slidably mounted. Plates 212 and 214 are rigidly secured to the elevator platform assembly.

A plate 218 is secured to and carried by the pulley cage for movement therewith, the ends of said member being provided with pivot pins 220. The outer end of each of a pair of arms 222 is pivotally mounted as at 224 to side members 202. The inner ends of arms 222 are provided with elongate slots 226 which slidably engage pins 220, thereby permitting the arms to be moved between the positions of Figs. 4 and 5.

A tension spring 230 is disposed between plate 214 and the lower end of rod 232, the upper end of which is secured to lower plate 234 of the pulley cage, whereby the pulley cage will be normally and yieldably urged downwardly from the position of Fig. 4 to that of Fig. 5 by the action of spring 230.

The weight of the elevator when lifted by cable 80 will oppose and overcome the counterforce of spring 230 for disposing the pulley cage and arms 222 in the relative positions illustrated in Figs. 4 and 6, in which condition brake 206 and pressure plates 200 are disposed in inoperative position with respect to guides A, thereby permitting the elevator to be freely moved along the guides of the hoisting tower assembly.

However, if cable 80 should break or become slack, pulley cage 216 will be instantly lowered to the position of Fig. 5, thereby swinging the outer end 223 of arms 222 upwardly about and relative to pivots 224 for engaging and lifting the uppermost of the mounting ears 207 which are rigidly secured to the brake shoes 206 and which are pivotally connected to parallel links 208 at 209. In this manner the entire length of the brake shoes will be uniformly and positively jammed against the rear surface of guide elements A. The jamming action will be augmented by pressure plates 200 which, being disposed closely adjacent or in sliding contact with the opposite or forward face of guide elements A, will, in ef-

fect, result in the front and rear faces thereof being compressed between adjacent faces of the pressure plates and brake shoes, whereby relative motion between the elevator and the hoisting tower will be positively precluded.

With particular reference now to Figs. 6 and 7, the numerals 240 denote stop elements engageable by and which limit the upward swing of parallel links 208.

In Figs. 8, 9 and 10 I have illustrated the preferred construction of the brake shoes which preferably include an arcuate braking surface 242 which is serrated as at 244 for providing a surface which will actually cut into the rear surface of guide elements A whenever the cable 80 is slack or broken and the parallel links 208 have been shifted to the horizontal position of Fig. 7.

In this manner I have thus provided simple, inexpensive, yet highly efficient, foolproof safety means in conjunction with the elevator of a hoisting tower.

In Fig. 11 I have illustrated the manner in which the elevator 62 of Fig. 1 may be provided with a dump bucket assembly of the type which includes means for automatically tipping the bucket to a dumping or discharge position when it reaches a certain elevation.

The numeral 300 denotes generally a bucket having rear and bottom walls 302 and 304, respectively, and a forwardly inclined front wall 306. The bucket is pivotally secured as at 308 to a channel element 310 secured to and spanning bottom 106 of the elevator platform. Pivotal connection 308 is disposed adjacent the intersection of forward wall 306 and bottom wall 304 whereby the bucket will be gravitationally maintained in the upright position of Fig. 11 by reason of portion 312 contacting the upper surface of beam 310.

A bucket dumping arm 386 is rigidly secured to and in projecting relationship with bucket 300, said arm comprising a cable sleeve or control cable follower 322 (Figs. 16 and 17) having an axial bore 324 therethrough for slidably receiving a control cable whose upper end is secured relative to an elevator guide A by means of a bracket 328 and an eye bolt 330. If desired, a supporting strut 332 may be provided for rigidly anchoring the eye bolt assembly relative to the tower.

The lower end of cable 326 may be secured to the eye 331 (Fig. 13) of an eye bolt 333 the shank of which extends through an aperture in the top web 334 of a channel 336 which is secured to and extends transversely of the lower end of the hoisting tower. A spring 338 is disposed between the adjacent faces of web 334 and an abutment 340 secured to the end of shank 333 such as by means of a nut 344. In this manner the control cable is maintained in a taut but yieldable condition along and in parallelism with the hoisting tower.

The control cable-follower is provided with a pair of transversely extending trunnions 350, and one end of the follower is tapered as at 352 for engaging socket portion 354 at one end of the cable-supported abutment means denoted generally by the numeral 356.

The cable abutment comprises a hollow shank 358 through which cable 326 extends and to which the abutment may be securely though releasably anchored by means of U-bolt 360 and pressure plate 362 which will be tightly compressed onto the cable incident to tightening of a nut onto the threaded end 364 of the U-bolt. With reference now to Fig. 11, it will be noted that the cable stop or abutment has thus been anchored to cable 326 whereby the tapered or socket-receptive end 352 of the cable follower will be received within socket 354 incident to relative upward movement of the bucket assembly relative to the control cable.

With particular reference now to Figs. 11, 12 and 18, the numeral 370 denotes a bucket actuator or cam which includes a pair of laterally spaced arcuate members 372 and 374 which define an arcuate channelway 376 dimensioned to receive the enlarged lower end or headed portion 378 of the cable abutment after the tapered end

352 of sleeve 322 has been received within socket 354. In the preferred embodiment of the invention surface 380 of arcuate member 372 is chamfered to facilitate its engagement with tapered face 382 of the cable abutment.

The bucket actuator plates 370 are fixedly secured as at 384 to arm 386 which is rigidly secured relative to the upper portion of bucket 300, note Fig. 11. The said bucket actuator plates are likewise pivotally secured to sleeve 322 on trunnions 350.

From the foregoing it will be noted that elevation of the elevator will cause tapered end 352 of follower 322 to be received within socket 354 of cable abutment 356, thereby terminating the upward relative motion of the sleeve relative to the stop, and for providing a fulcrum about which the arcuate cam members 370 are swung whereby to initially strike against and then pass outwardly over or around the enlarged lower portion 378 of the abutment for disposing the shank 358 of the abutment between the cam members and within throat or channelway 376, thereby imparting a turning force to bucket 300 as the elevator is lifted further whereby the bucket will be tilted to the discharge position illustrated in Fig. 12.

After the contents of the bucket have been discharged, lowering of the elevator will automatically return the bucket to the upright position of Fig. 11 incident to a lowering of the bucket actuator relative to and then from engagement with the cable abutment.

The aforesaid means enables a dump bucket to be automatically dumped to a discharging position incident to elevation of the platform to a predetermined position relative to the hoisting tower thereby rendering it unnecessary to require the presence of workmen on the elevator for dumping the bucket. It also provides positive protection against accidental or unintentional dumping of the bucket.

In Fig. 20 I have illustrated the manner in which a hoisting boom 400 may be associated with elevator platform 106 for thereby providing a platform derrick in order to obtain maximum utility of the hoist.

The numeral 402 denotes a mounting channel secured to and carried by a cross beam 404 which spaningly engages side elements 106 of the elevator platform. A third channelway 406 spans the upper ends of channel 402 and provides a bearing plate for a rotatable trunnion 410 having a pair of upstanding, laterally spaced ears 412 between which the lower end 414 of boom 400 is pivotally secured as at 416.

With particular reference to Fig. 20, it will be noted that the upper end of the boom is secured relative to the upper end of the tower by means of a cable 420.

In the preferred embodiment of the invention, I utilize the elevator hoisting cable 80 for the hoisting boom by first anchoring the elevator in an elevated condition with respect to the hoisting tower, such as by means of a stop member 430 which extends transversely across the laterally spaced tower elements 1432 and beneath the lower set of wheels 60. Elements 1432 interconnect the elongate track defining elements or guides A and B. After the elevator platform 106 has thus been secured relative to the tower, the end of hoisting cable 80 is disconnected from the elevator and is then threaded under pulley 432 secured to and carried by the lower end of boom 400 as at 434 and thence over pulley 436 rotatably journaled as at 438 between plates 440 at the upper end of the boom. I am thus able to utilize not only the elevator hoisting cable but also the power means for elevating the elevator to operate the derrick attachment, thereby providing a highly efficient device having maximum utility with a minimum of expense.

It should be understood that various changes and modifications, within the scope of the appended claims, may be made, without departure from the spirit of the invention.

What is claimed is:

1. In combination: An elevator tower, an elevator platform, means for raising and lowering the platform relative to the tower, a bucket having rear, bottom, side and front walls, means pivotally mounting the front portion of the bucket bottom to the platform, an actuator arm secured to and projecting forwardly of the bucket, an abutment, means mounting said abutment relative to the tower, means on said actuator arm continuously engaging said abutment mounting means, and other means on said actuator arm engageable with said abutment incident to raising of the platform for automatically swinging said bucket forwardly about its pivotal connection to discharge position, and for returning said bucket from discharge position back to an upright position on the platform incident to lowering of the platform.

2. In combination: An elevator tower, an elevator platform, means for raising and lowering the platform relative to the tower, a bucket having rear, bottom, side and front walls, means pivotally mounting the front portion of the bucket bottom to the platform, an actuator arm secured to and projecting forwardly of the bucket, a control cable in spaced parallelism with said tower, abutment means secured to and carried by said cable, and follower-cam means on said actuator arm engageable with said cable and abutment means incident to raising of the platform for automatically swinging said bucket forwardly about its pivotal connection to discharge position, and for returning said bucket from discharge position back to an upright position on the platform incident to lowering of the platform.

3. In combination: An elevator tower, an elevator platform, means for raising and lowering the platform relative to the tower, a control cable extending along the tower, a bucket having rear, bottom, side and front walls, means pivotally mounting the front portion of the bucket bottom to the platform, an actuator arm secured to and projecting forwardly of the bucket toward the control cable, abutment means secured to and carried by said cable, means on said actuator arm including a control cable-follower and an abutment-cam, said cable-follower having an axial bore for slidably receiving said cable, said cam including a pair of arcuately slotted members pivotally secured to and on opposite sides of the cable-follower, said cable-follower adapted to abut said abutment means for providing a fulcrum about which the

cam is swung incident to raising of the platform into spanning engagement with the abutment means for swinging the bucket forwardly about its said pivotal connection to discharge position and for returning said bucket from discharge position back to an upright position on the platform incident to lowering of the platform.

4. The combination described in claim 3, wherein the abutment means includes a socket portion circumscribing the control cable, and wherein the upper end of the cable-follower terminates in a socket-receptive head.

5. In combination: An elevator tower, an elevator platform, means for raising and lowering the platform relative to the tower, a control cable extending along the tower, a bucket having rear, bottom, side and front walls, means pivotally mounting the front portion of the bucket bottom to the platform, an actuator arm secured to and projecting forwardly of the bucket toward the control cable, abutment means including a shank portion terminating in an enlarged lower end secured to and carried by said cable, an abutment-cam including a pair of arcuately slotted members secured to said actuator arm, a control cable-follower having an axial bore for slidably receiving said cable, said follower pivotally mounted to and between said arcuate members, said cable-follower adapted to abut the lower end of said abutment means for providing a fulcrum about which the arcuate cam-members are swung over the enlarged lower end of the abutment and straddling the shank portion thereof for swinging the bucket forwardly about its said pivotal connection to discharge position incident to raising of the platform, and for returning said bucket from discharge position back to an upright position on the platform incident to lowering of the platform.

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