



**No. 671,242.**

**Patented Apr. 2, 1901.**

**W. E. SMITH.**  
**PILE DRIVER.**

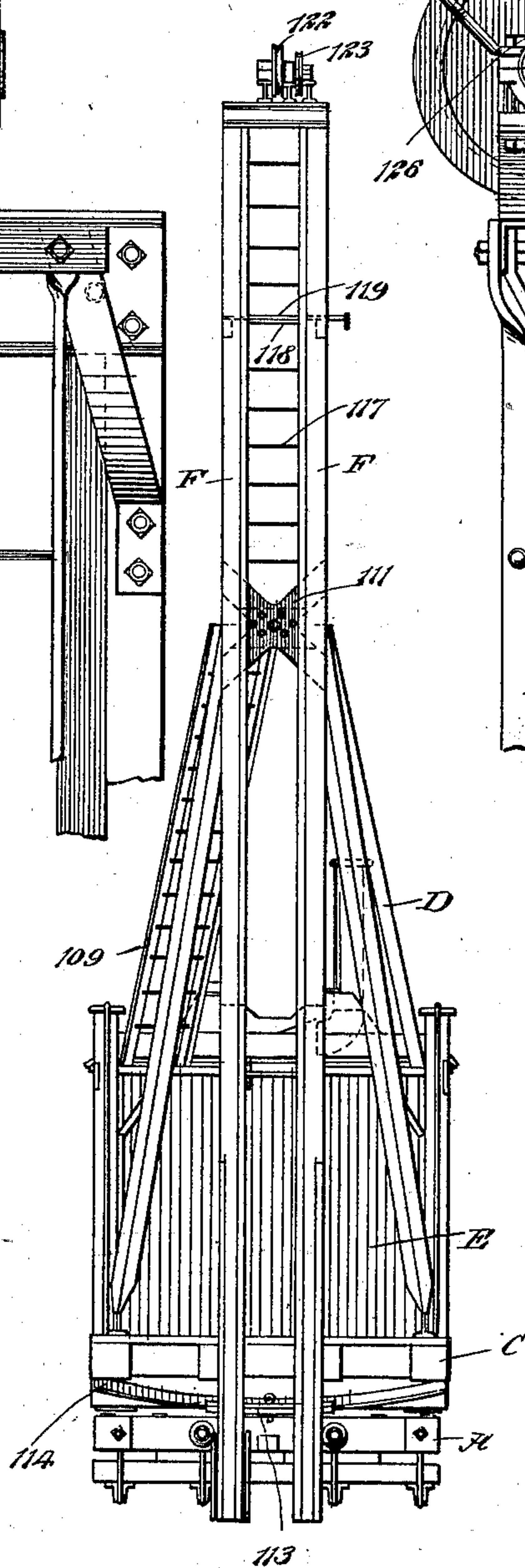
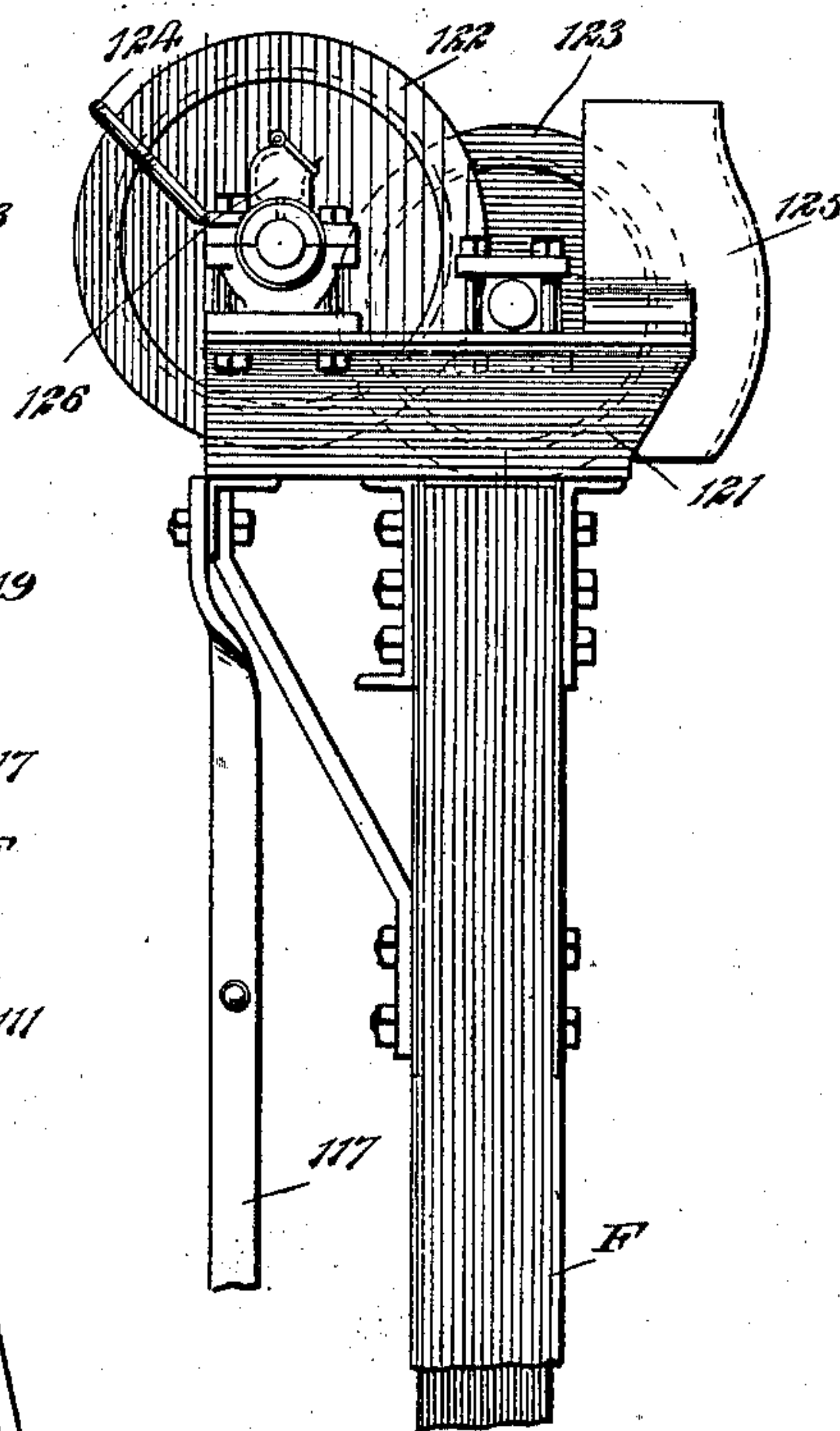
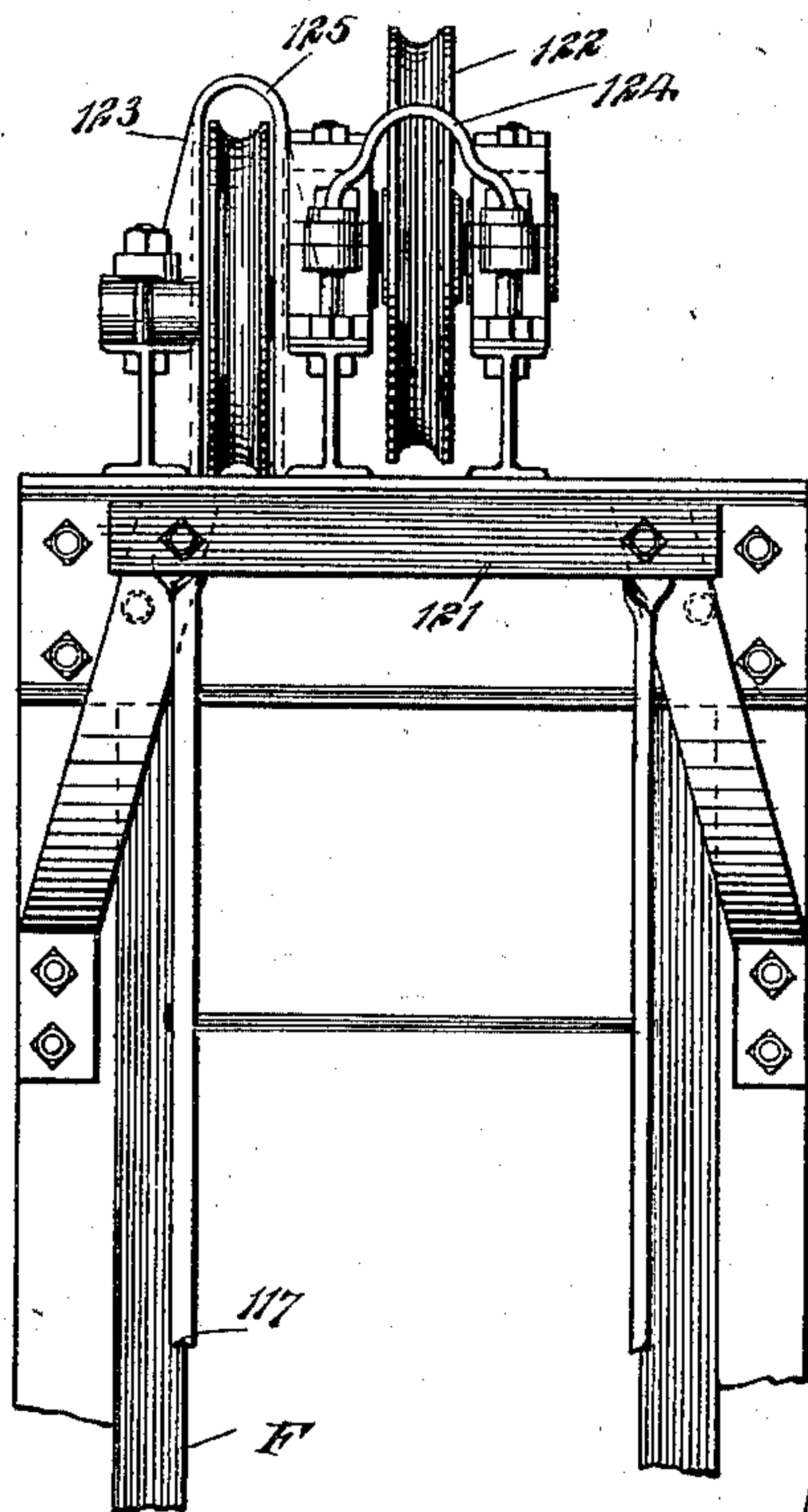
Application filed Jan. 5, 1900.)

(No Model.)

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Fig. 4

Fig. 5



**WITNESSES:**

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INVENTOR

Willie E. Smith  
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No. 671,242.

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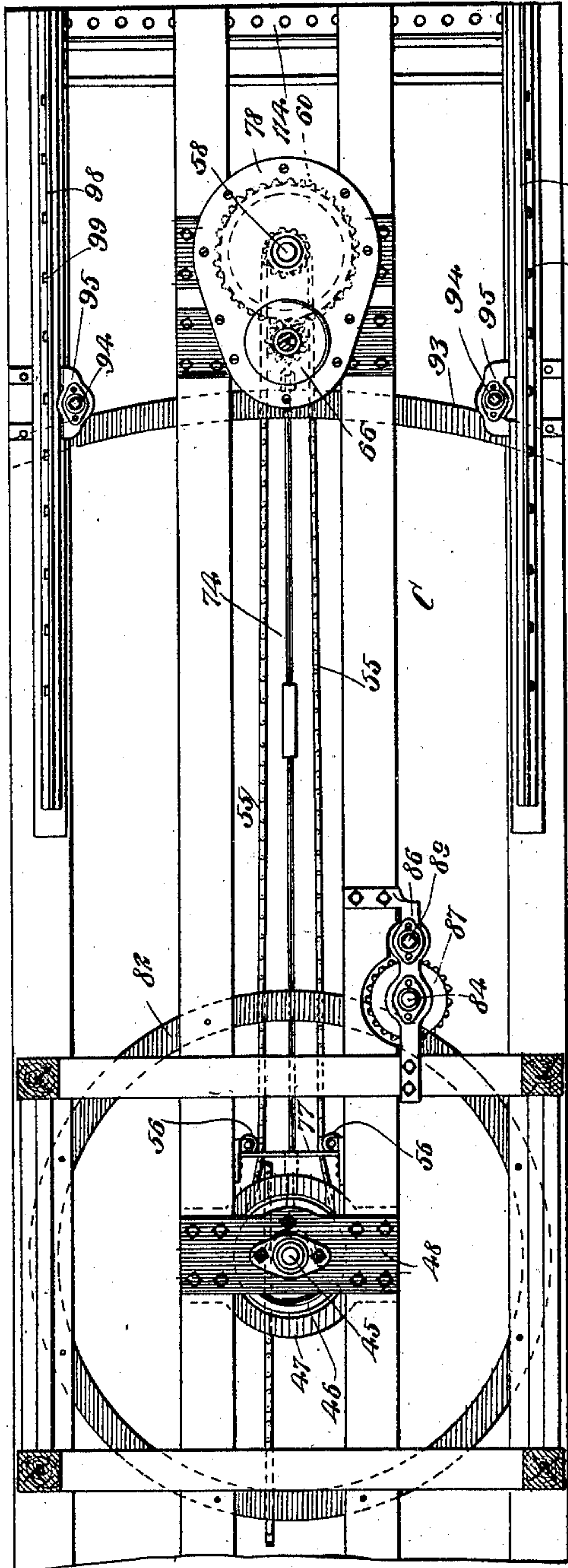
W. E. SMITH.

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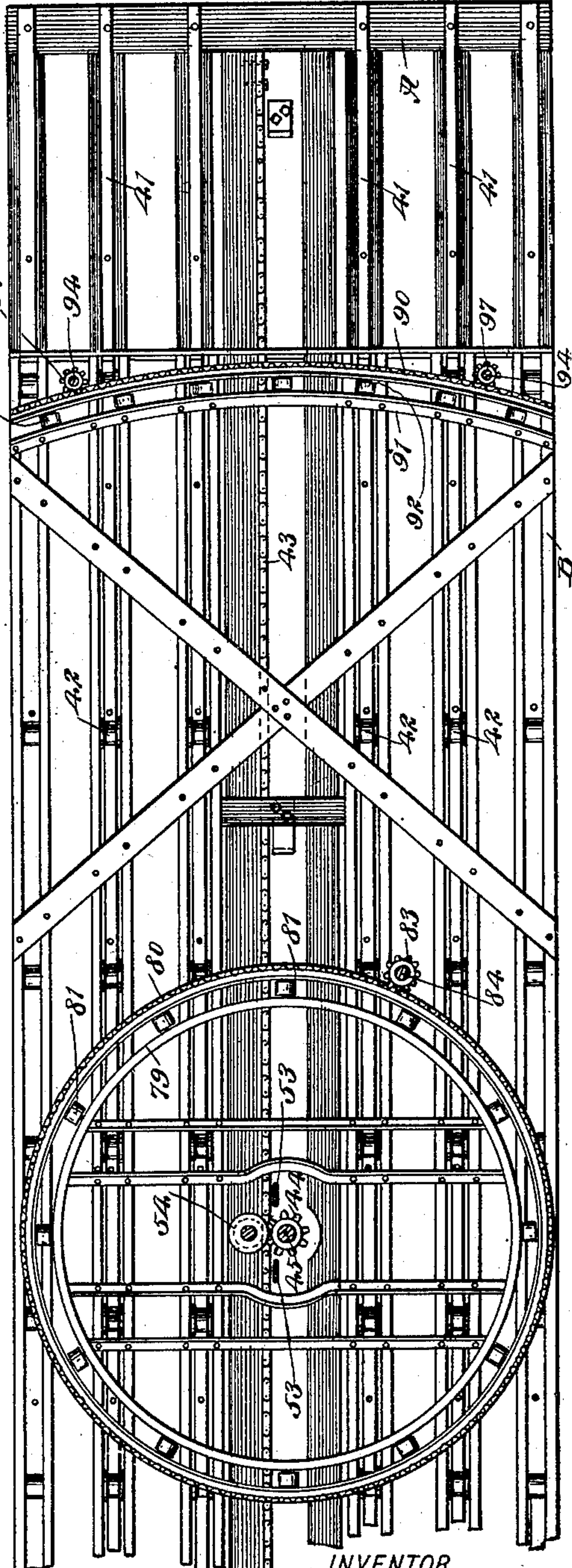
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Fig. 6



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Fig. 7



No. 671,242.

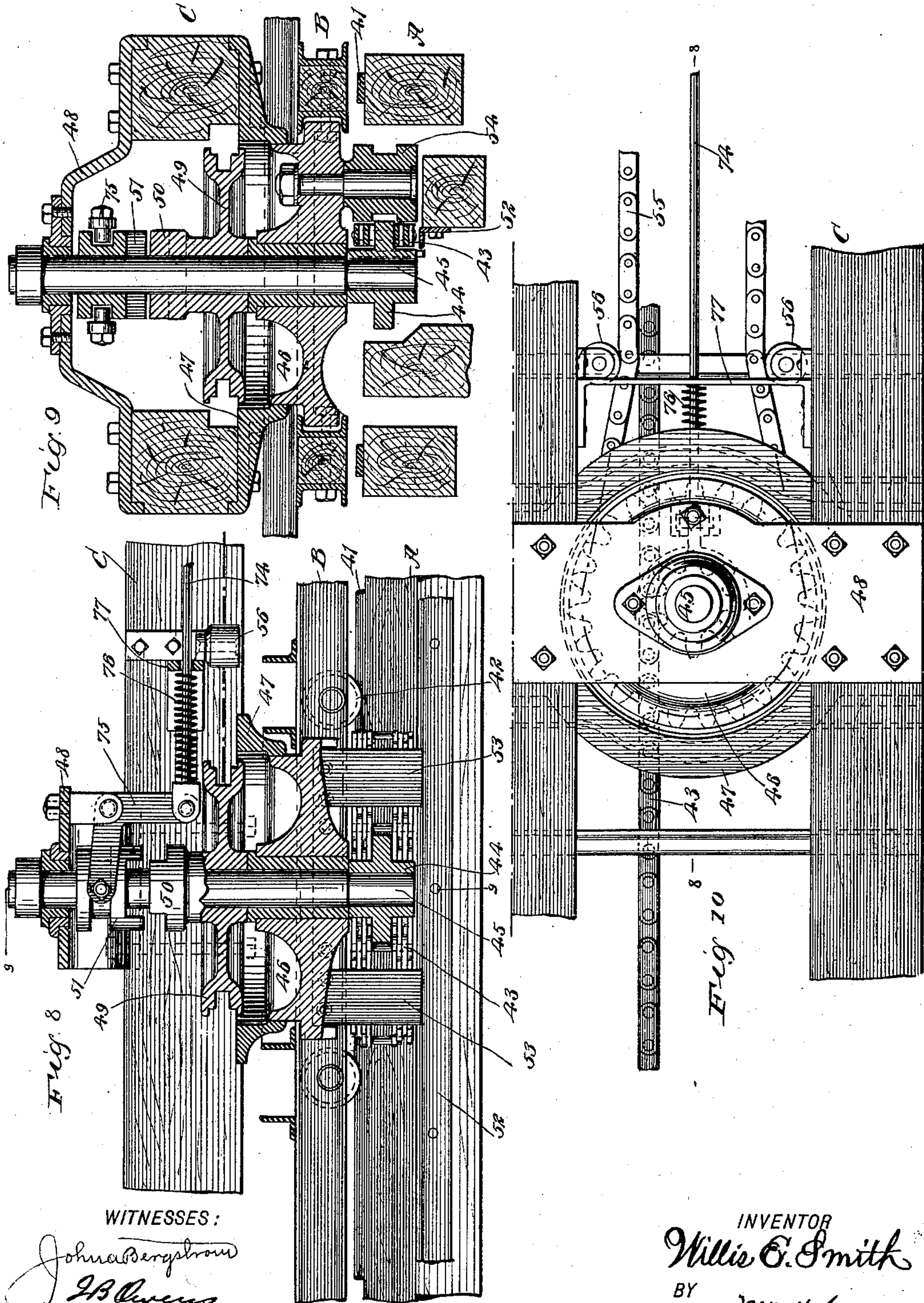
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11 Sheets—Sheet 4.



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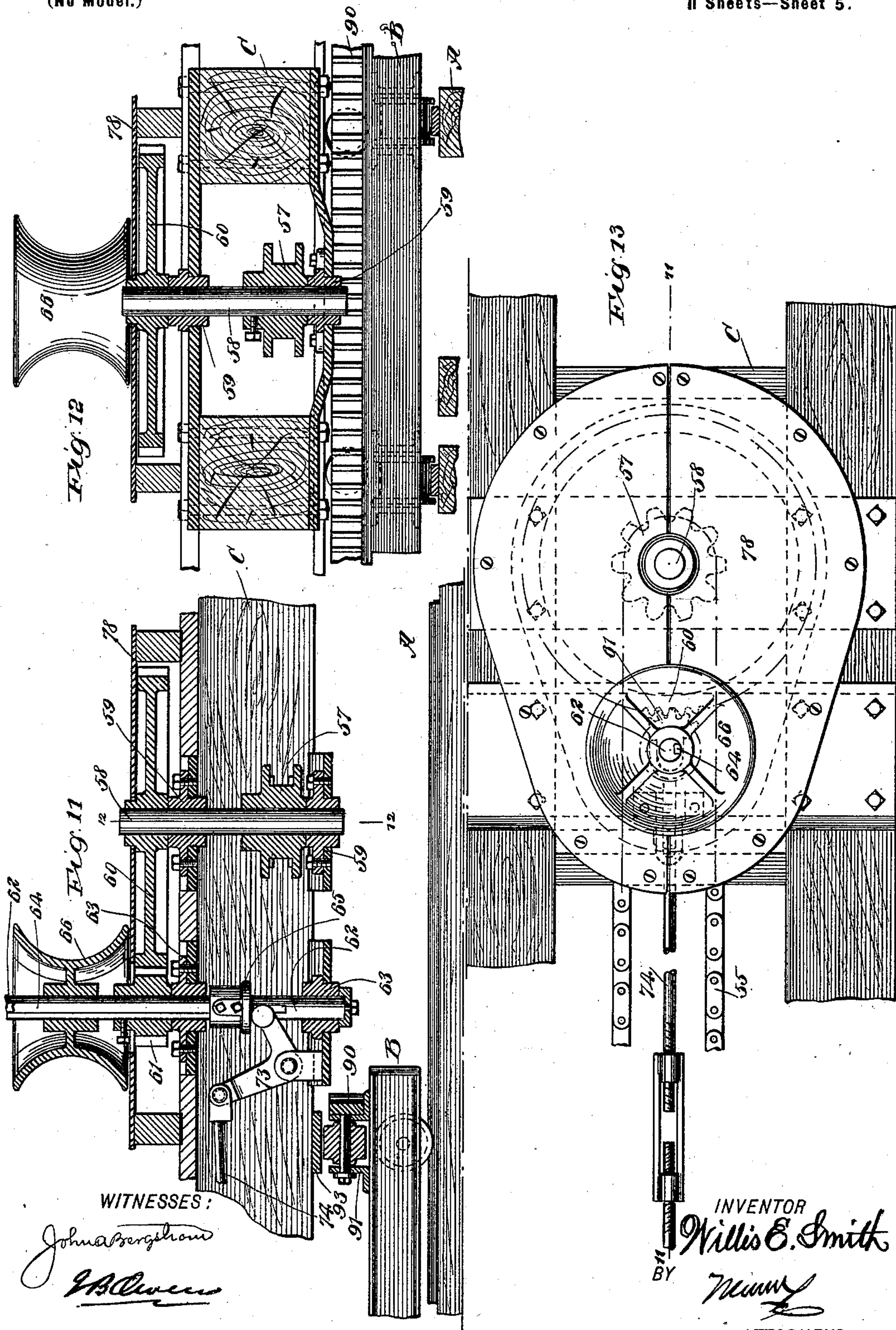
Patented Apr. 2, 1901.

W. E. SMITH.  
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(Application filed Jan. 5, 1900.)

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11 Sheets—Sheet 5.



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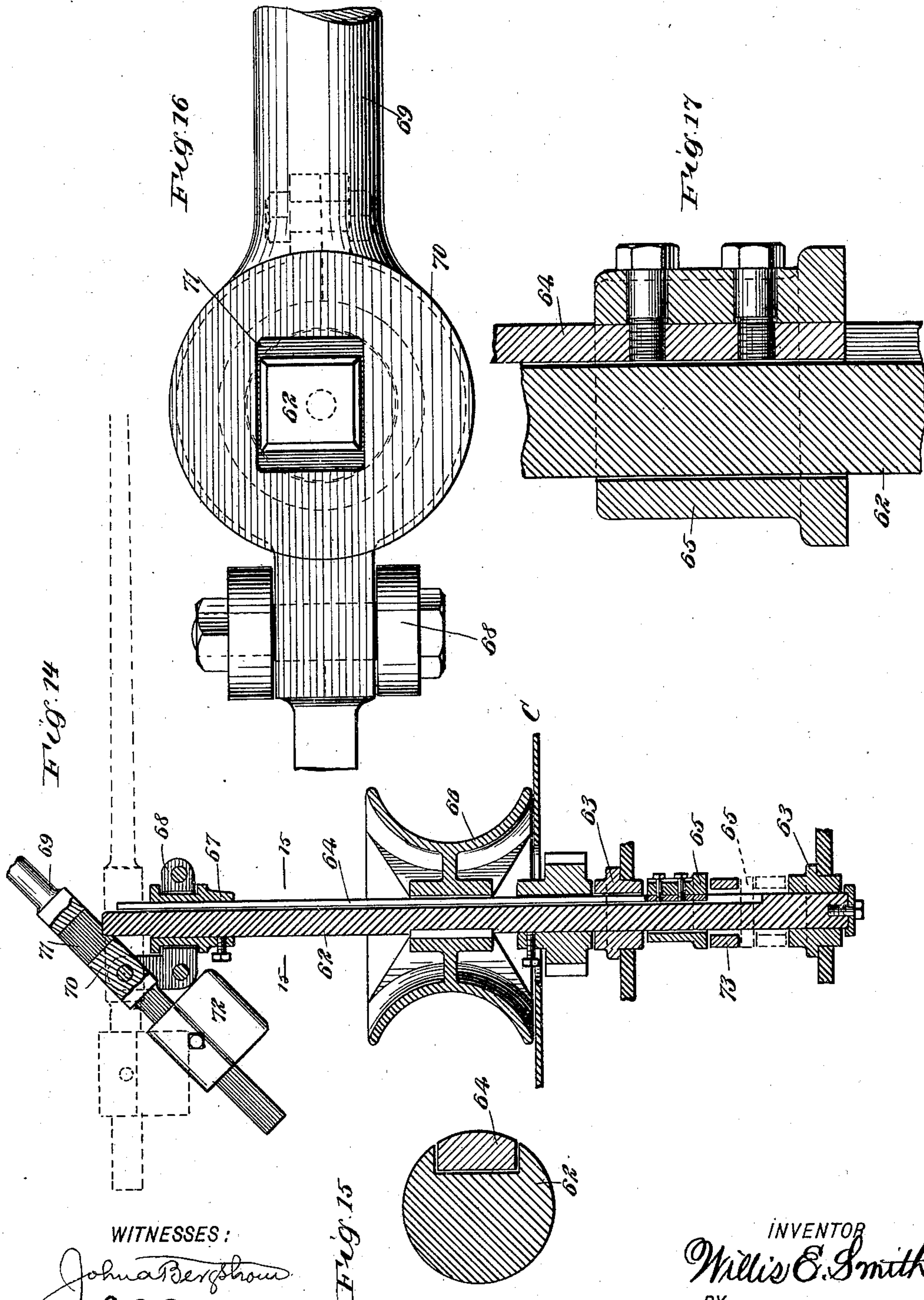
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W. E. SMITH.  
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11 Sheets—Sheet 6.



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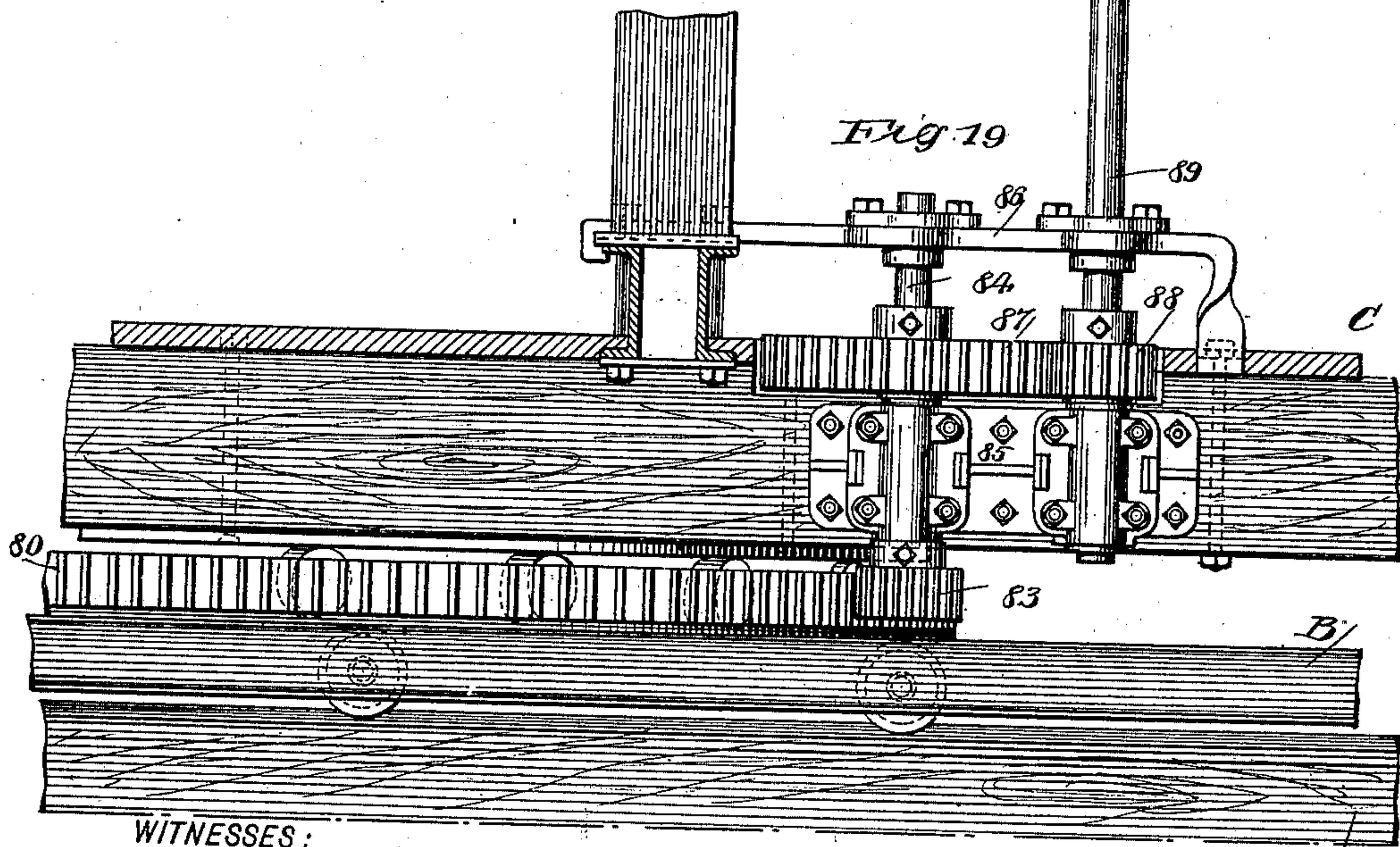
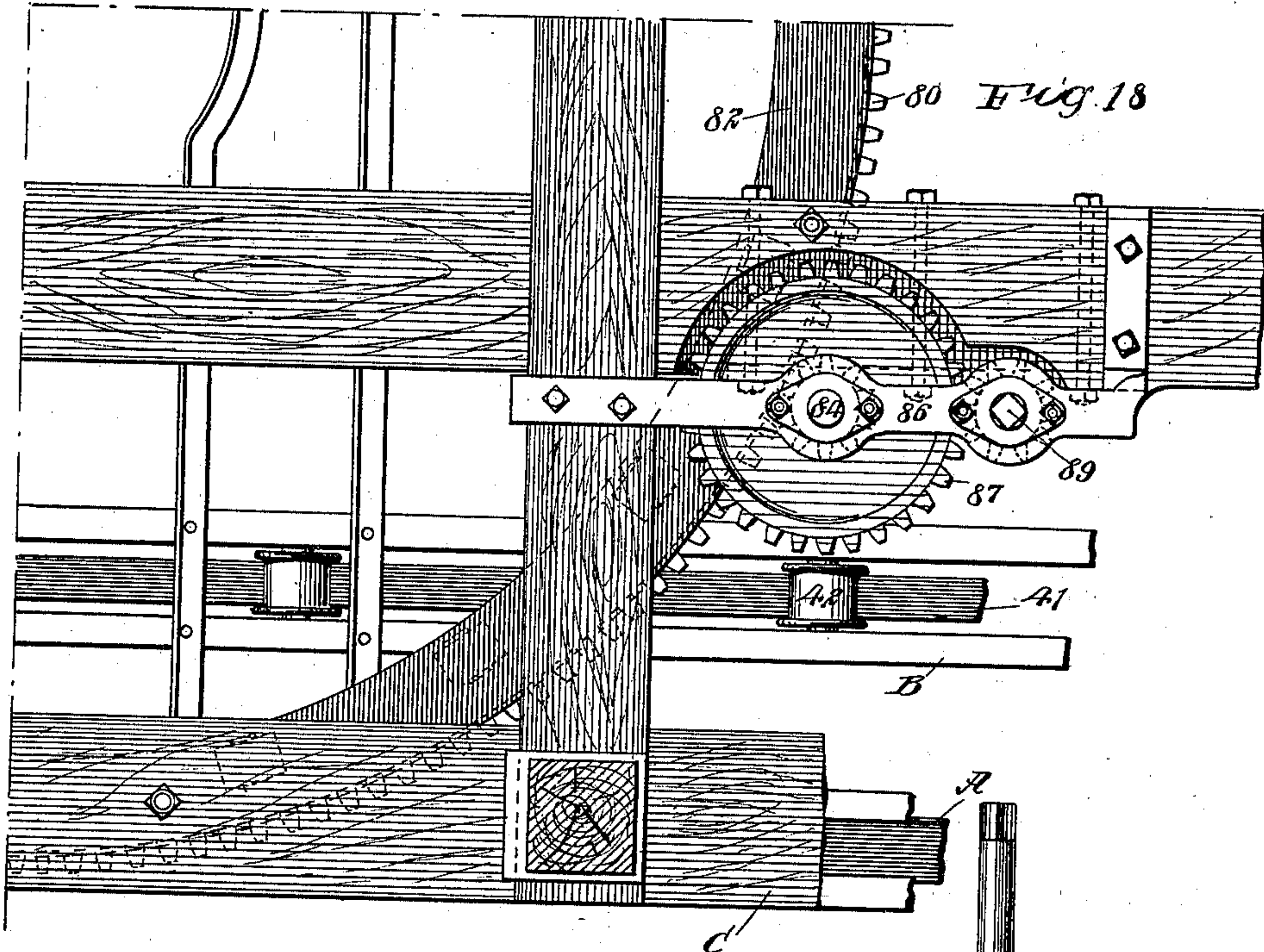
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W. E. SMITH.  
PILE DRIVER.

(No Model.)

(Application filed Jan. 5, 1900.)

11 Sheets—Sheet 7.



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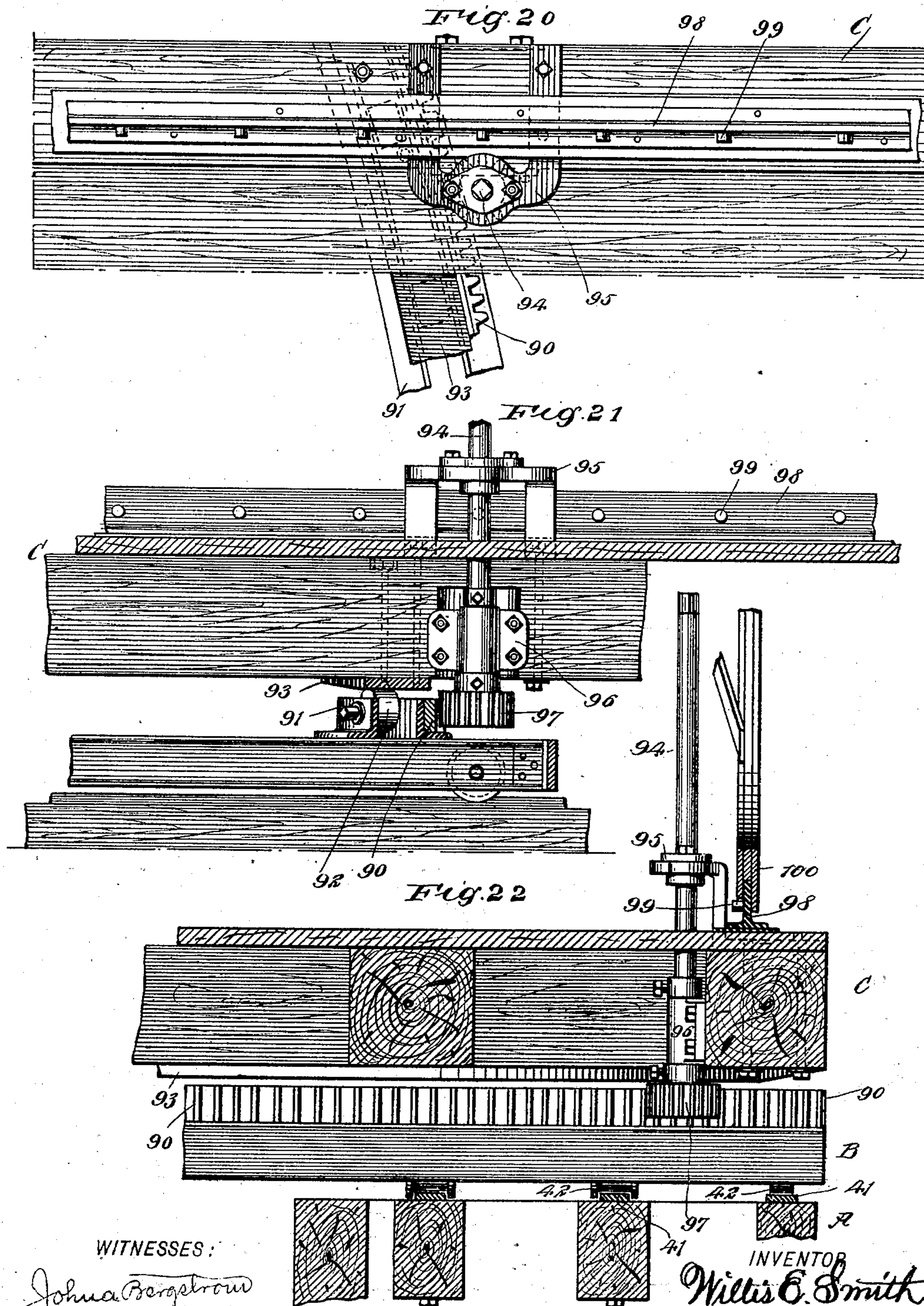
W. E. SMITH.

PILE DRIVER.

(Application filed Jan. 5, 1900.)

(No Model.)

11 Sheets—Sheet 8.



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No. 671,242.

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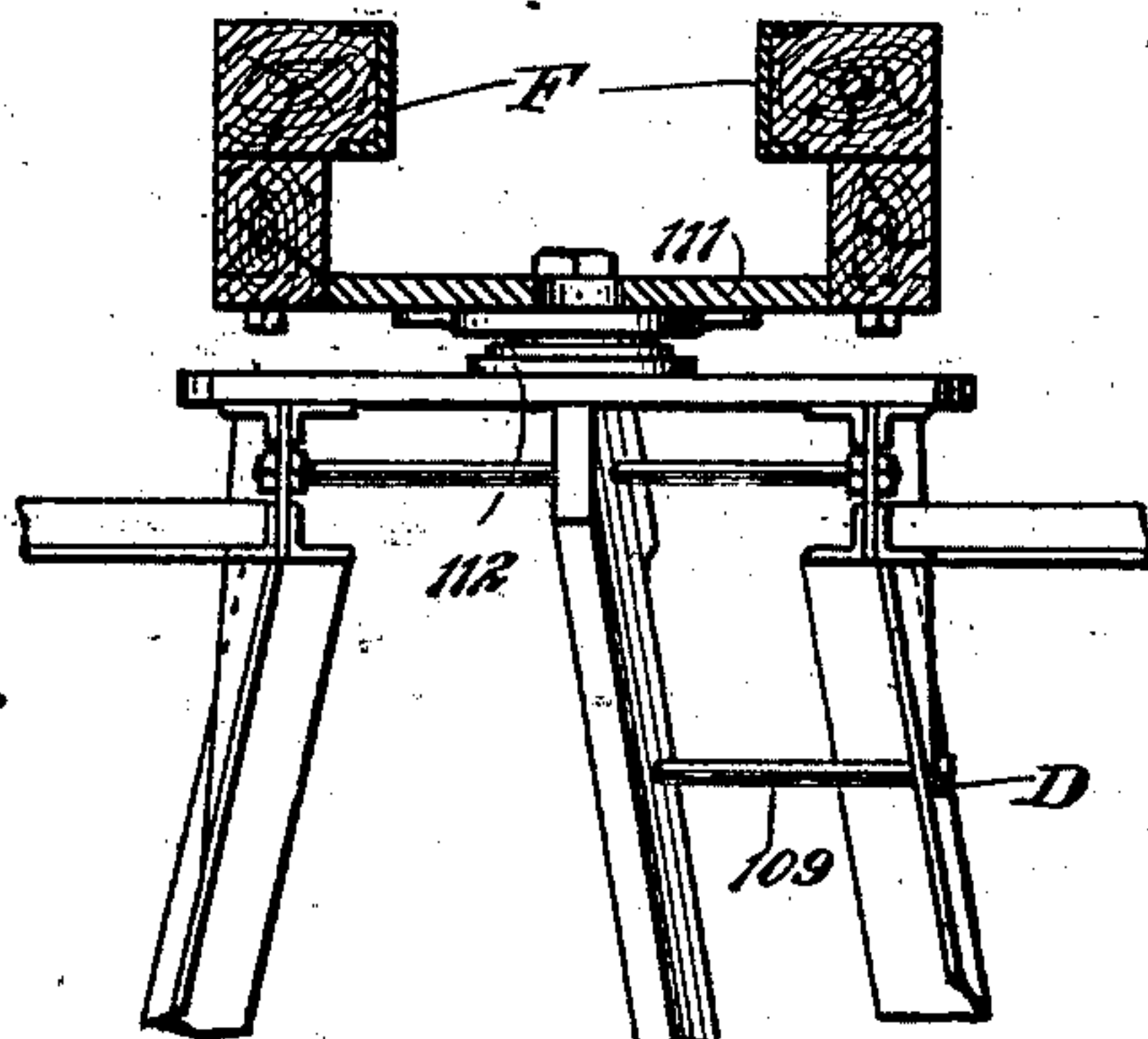
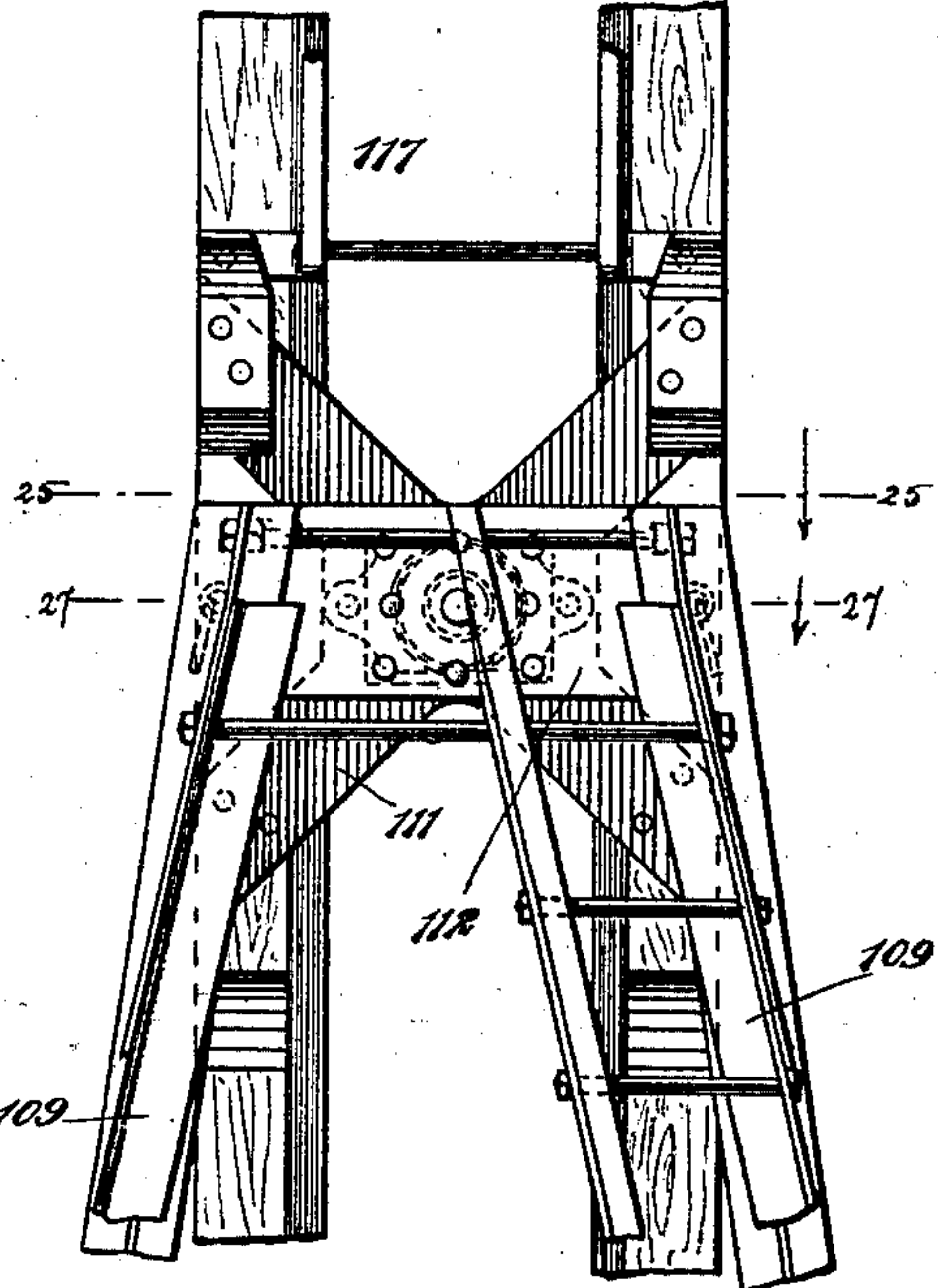
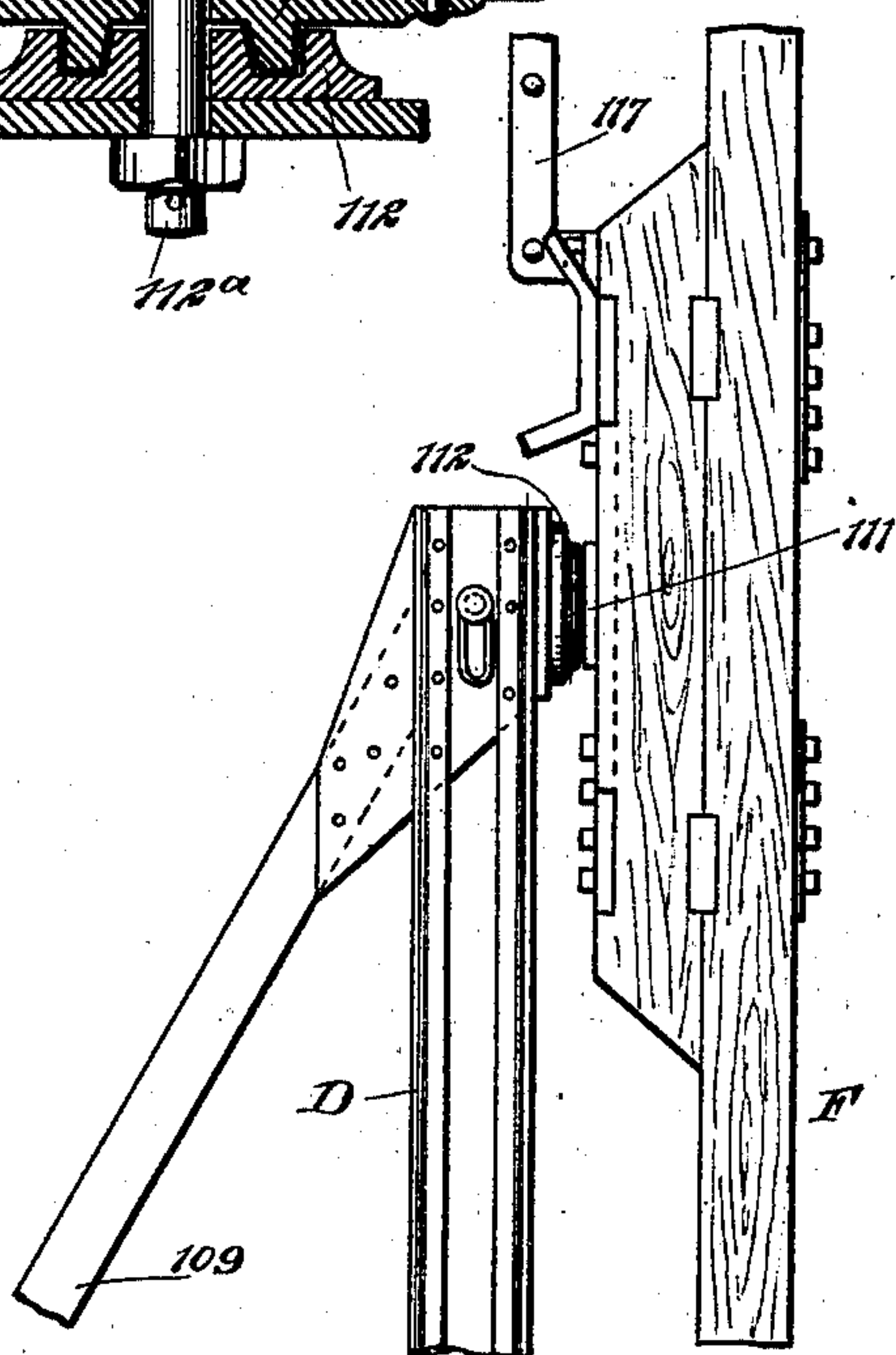
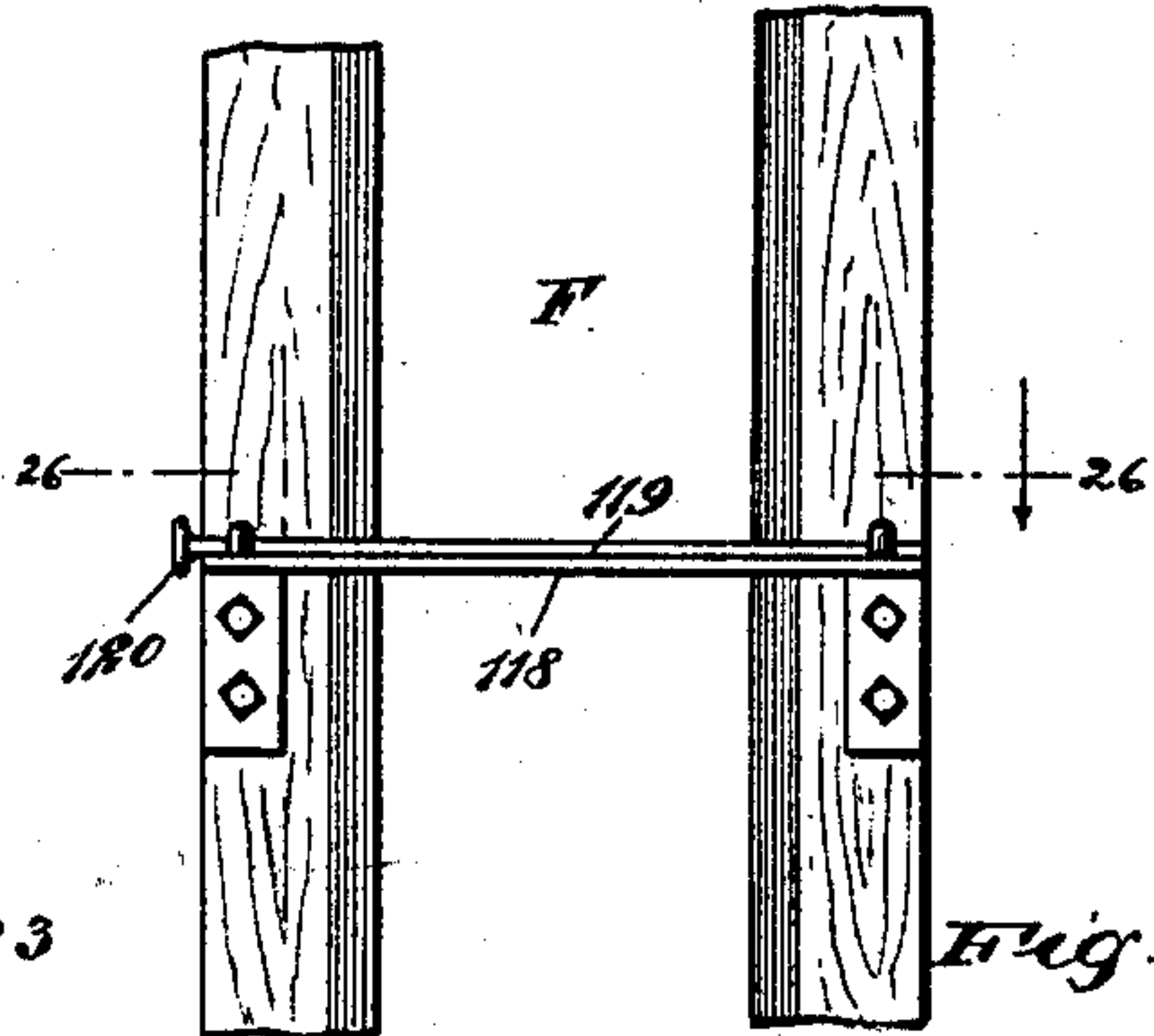
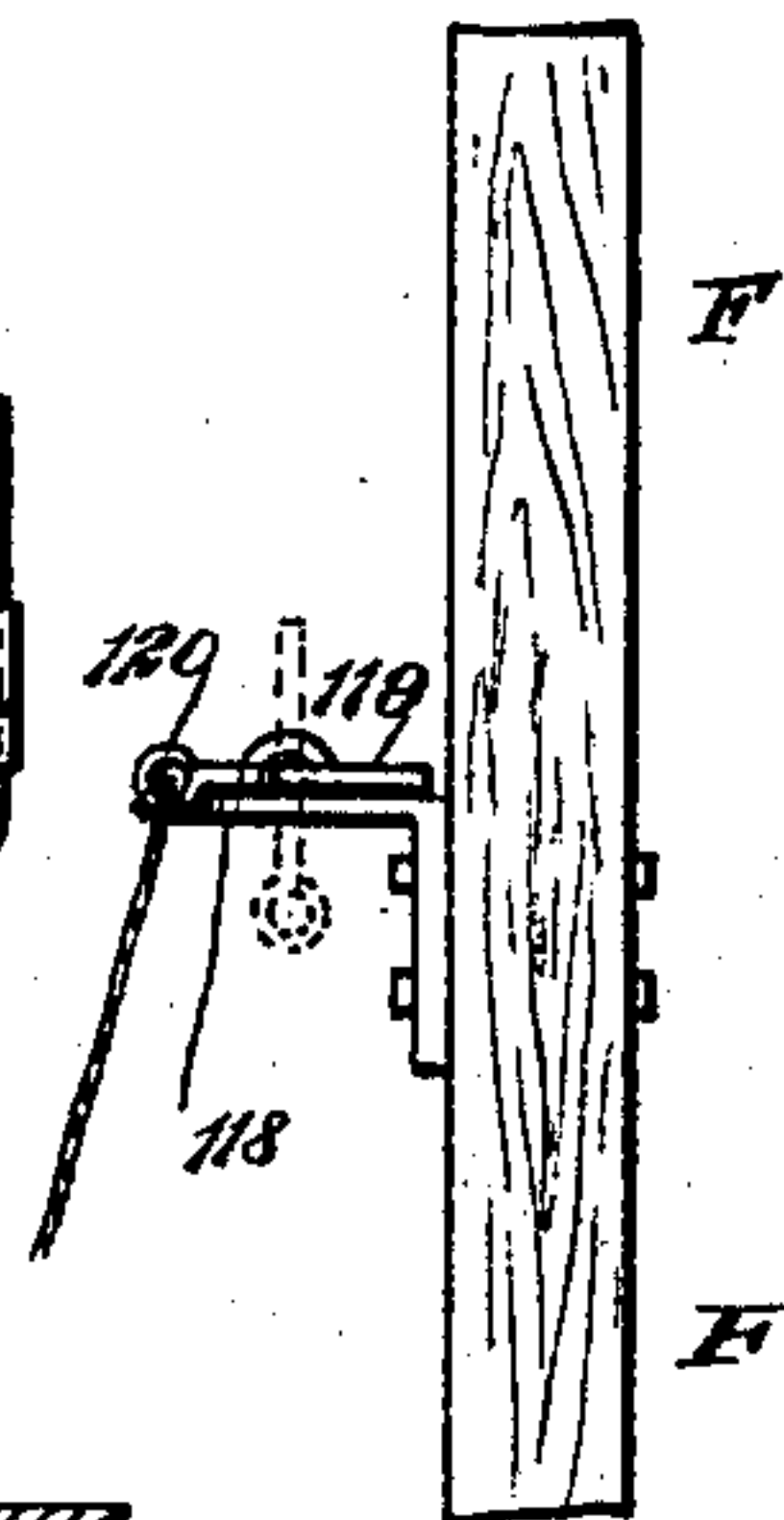
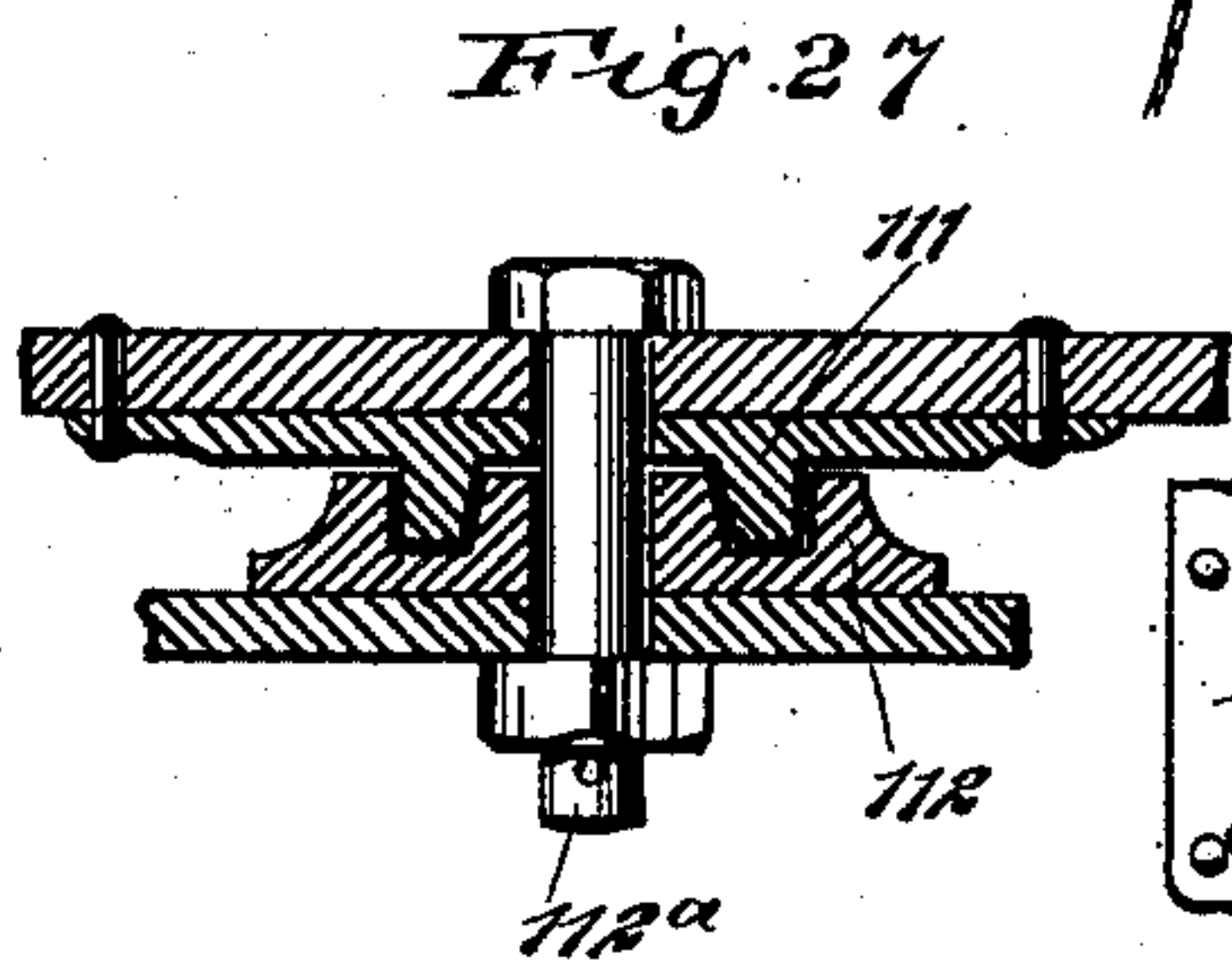
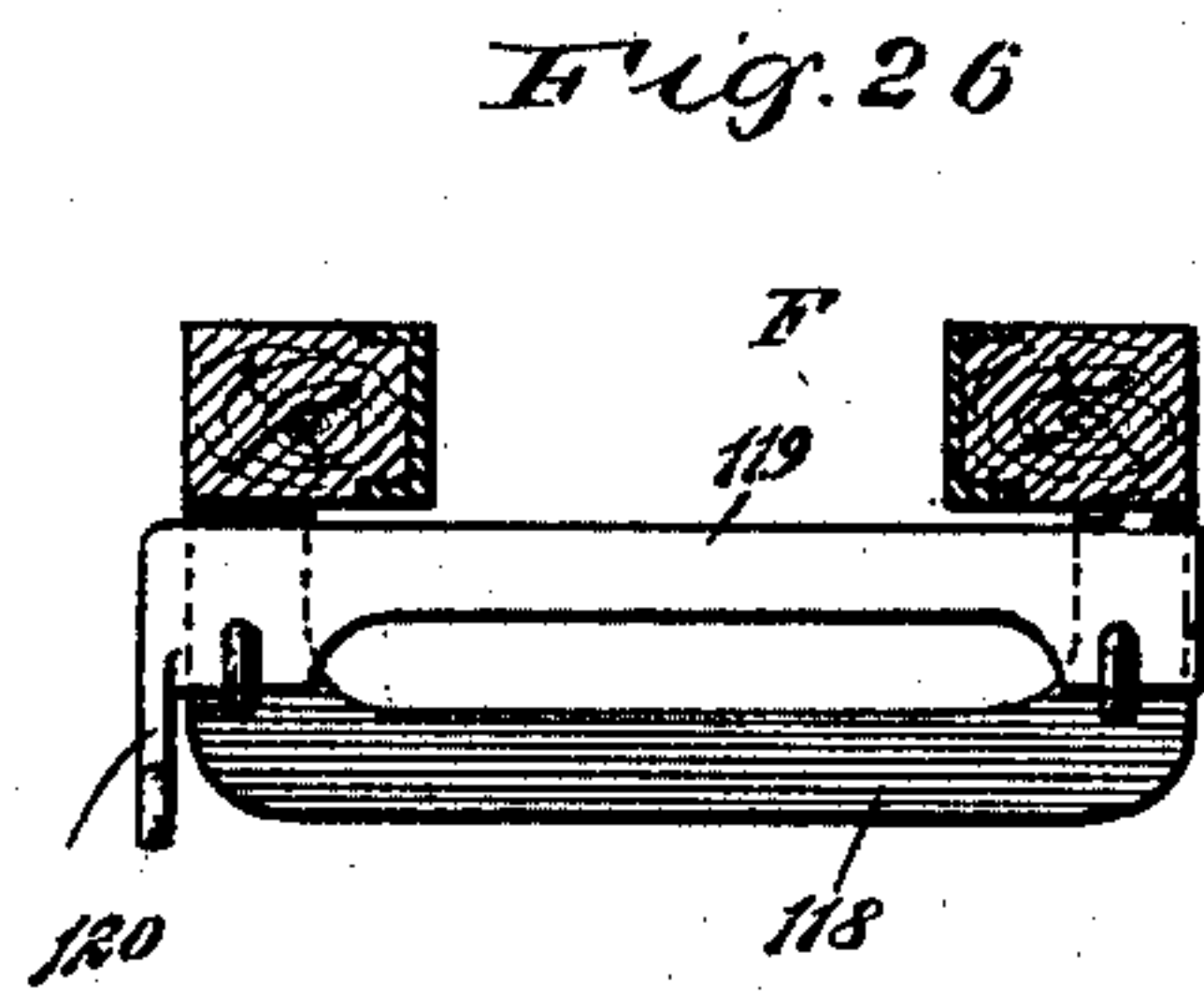
W. E. SMITH.

PILE DRIVER.

(Application filed Jan. 5, 1900.)

(No Model.)

11 Sheets—Sheet 9.



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No. 671,242.

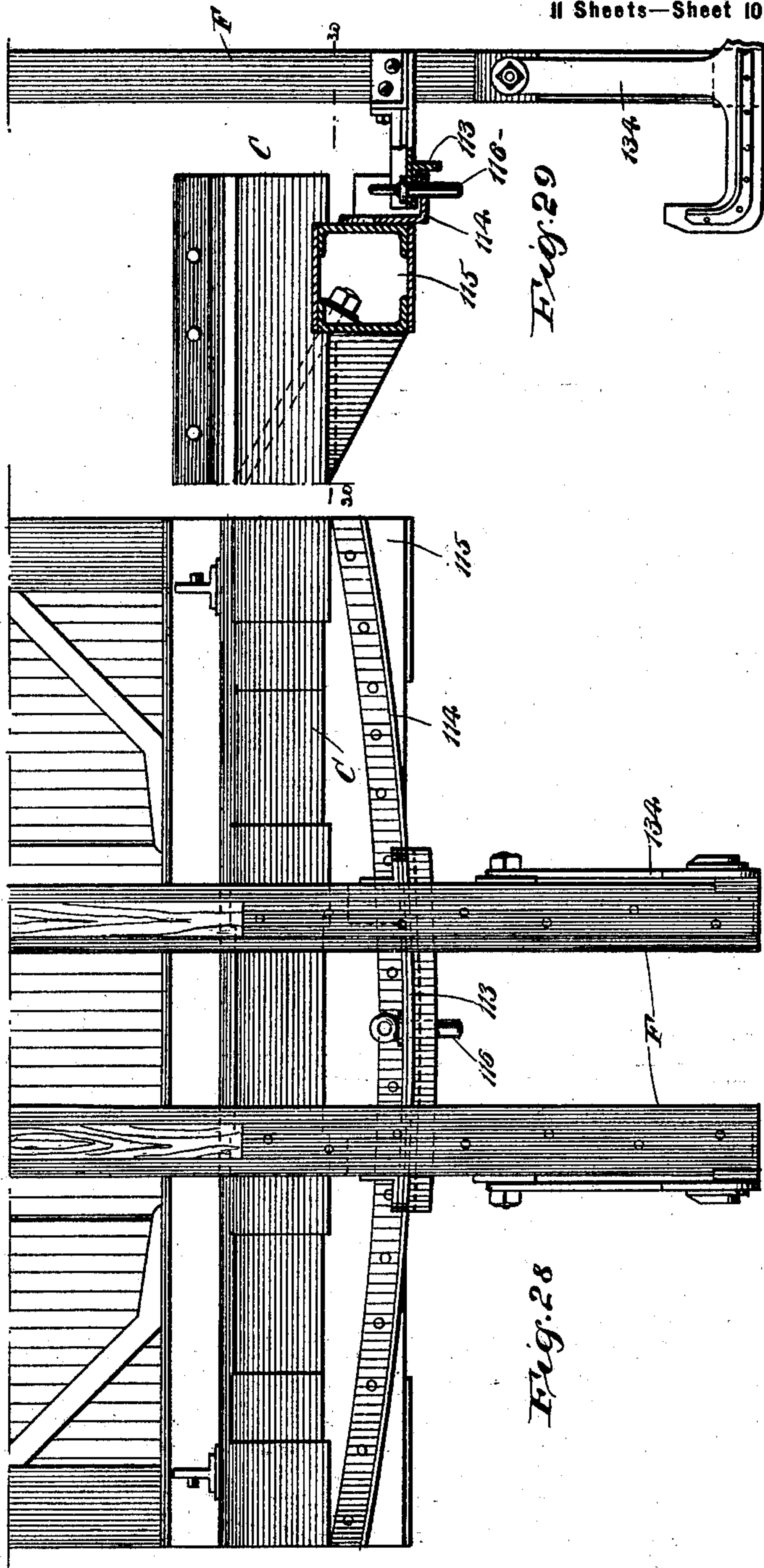
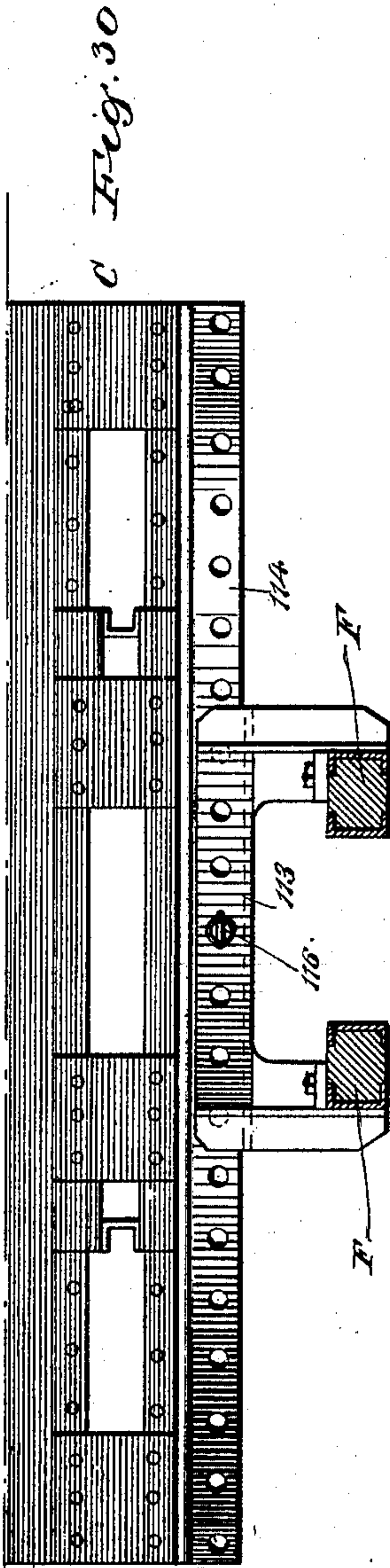
Patented Apr. 2, 1901.

W. E. SMITH.  
PILE DRIVER.

(Application filed Jan. 5, 1900.)

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11 Sheets—Sheet 10.



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(No Model.)

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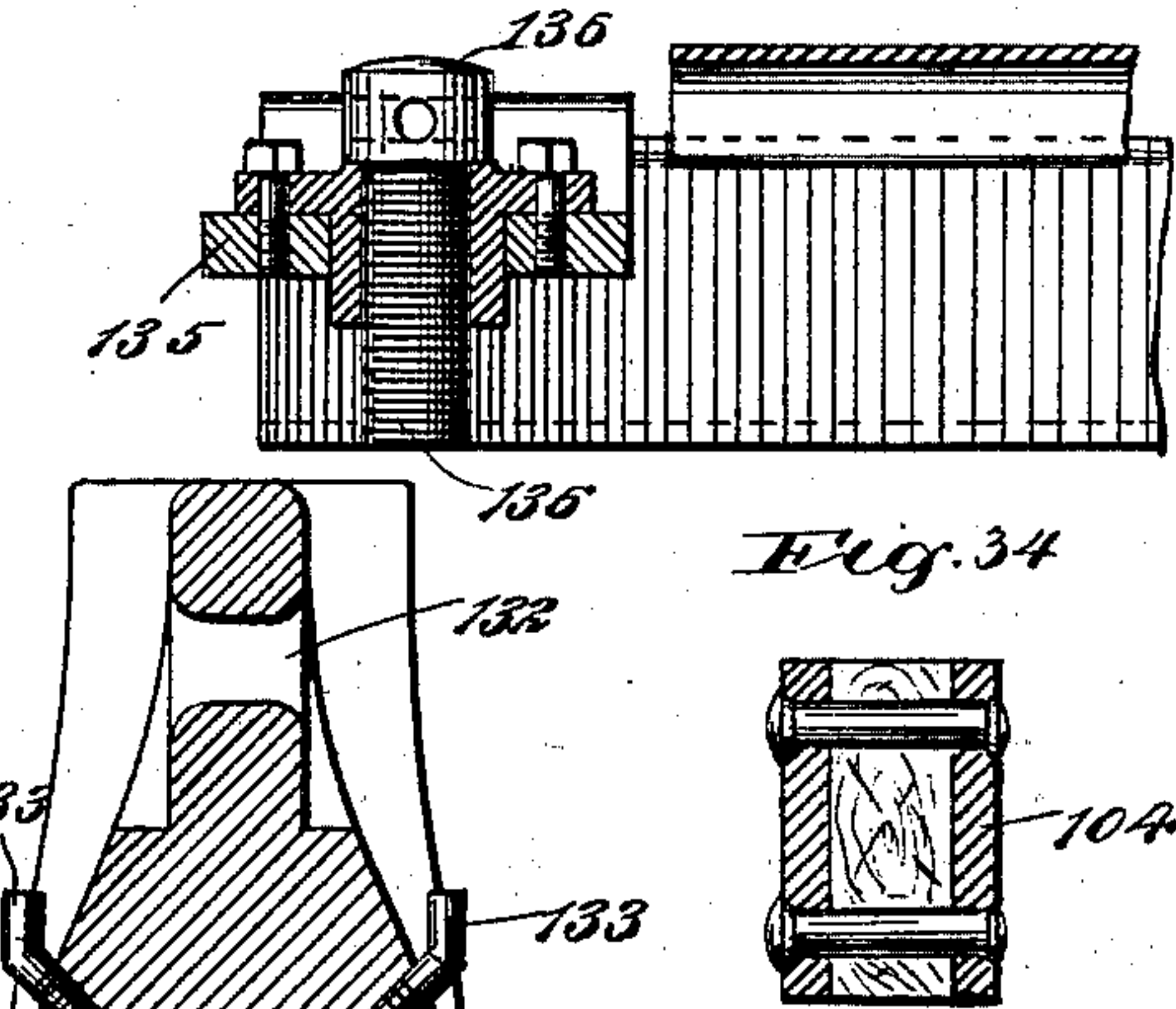
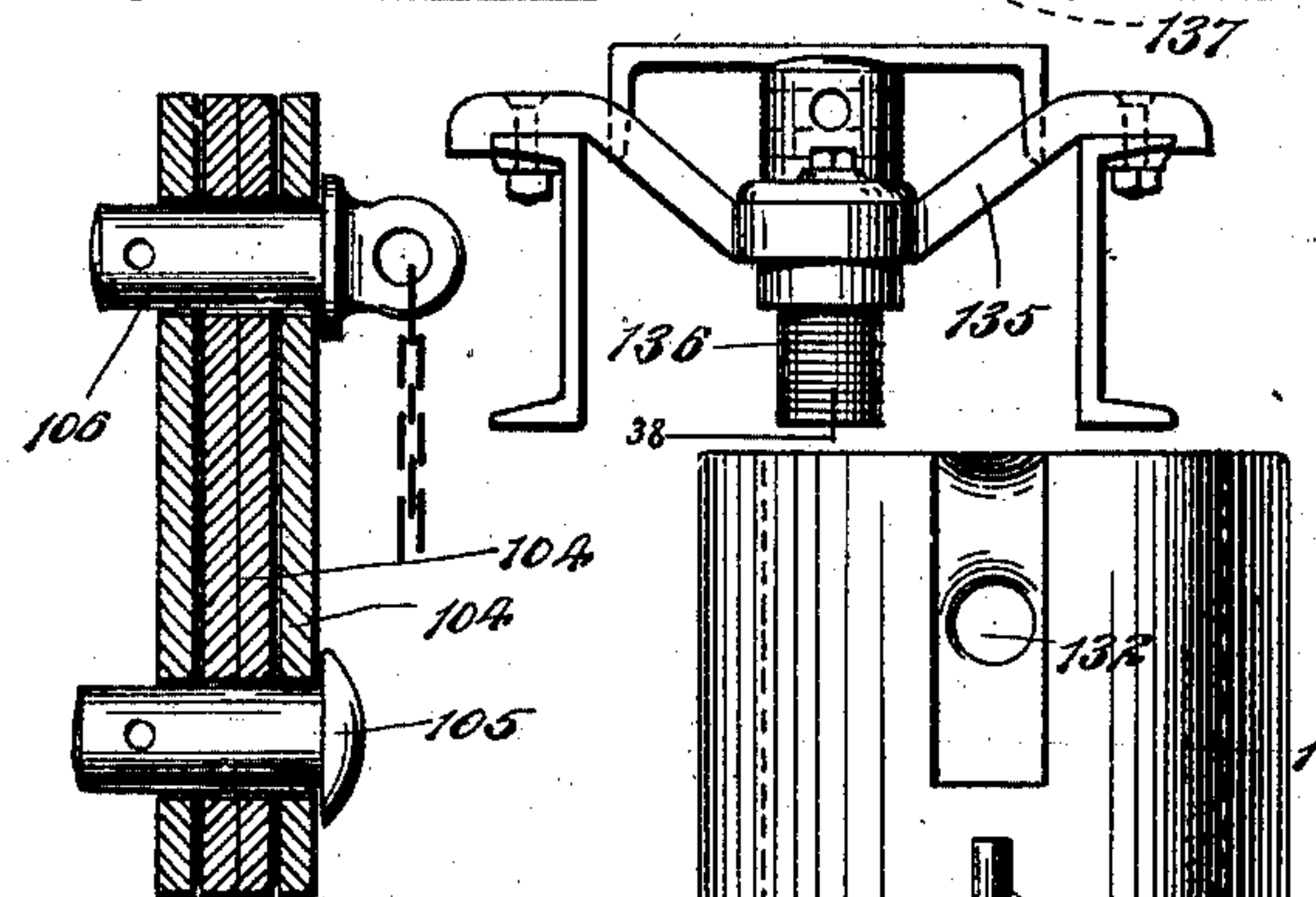
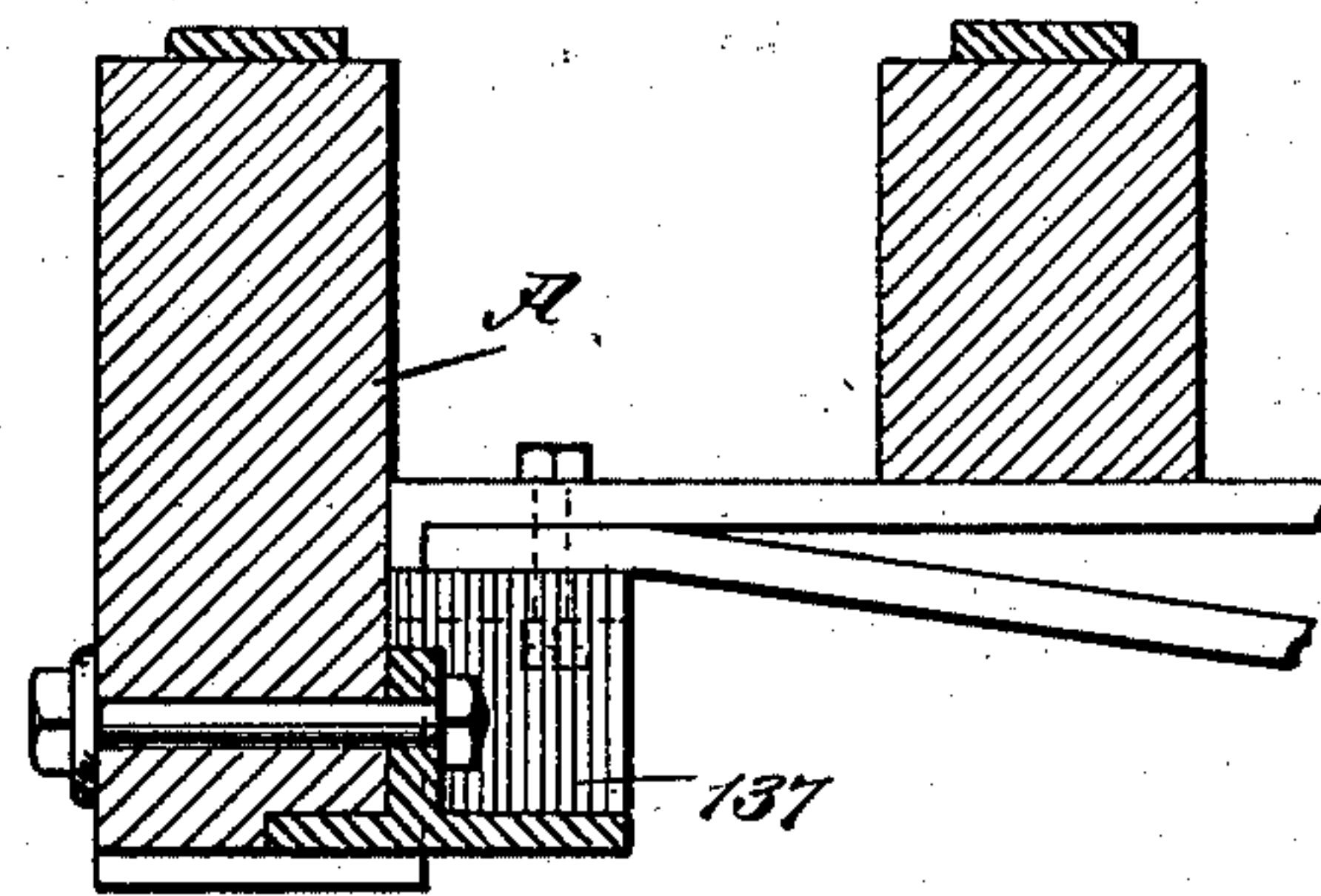
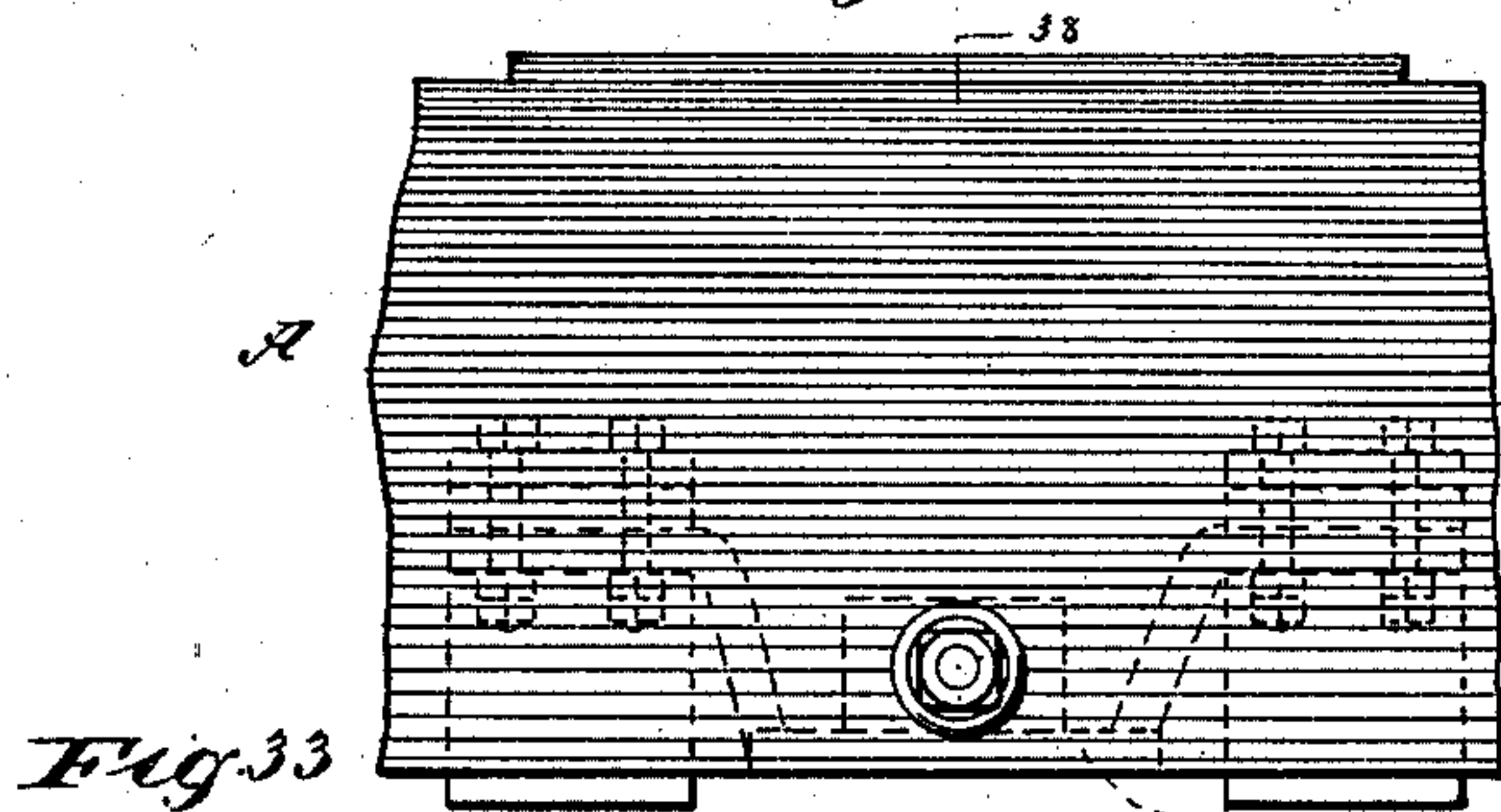
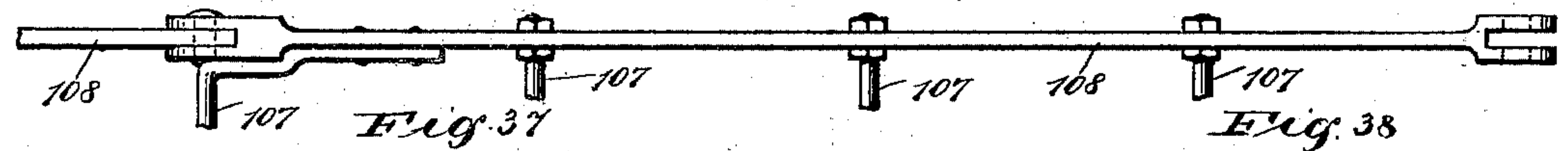
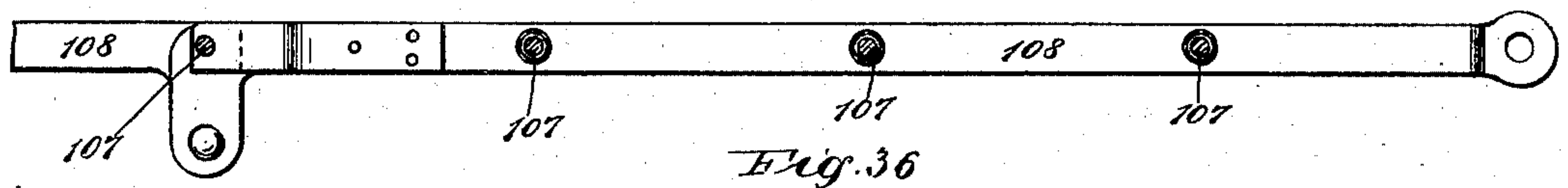
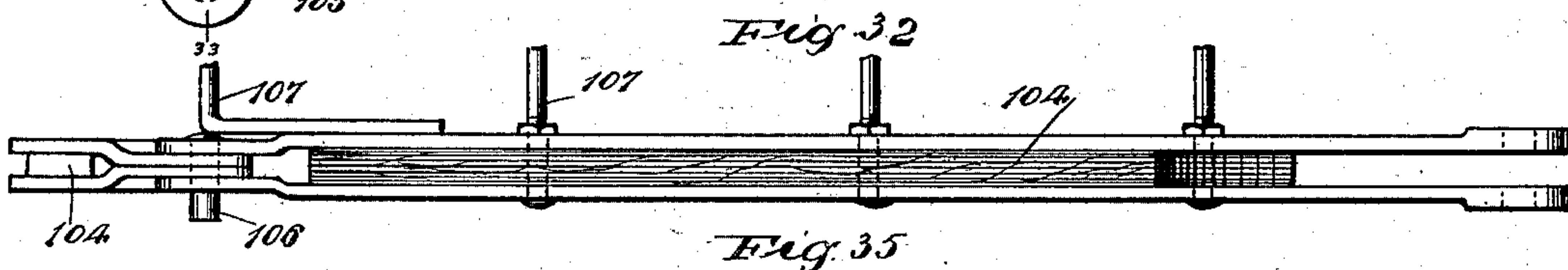
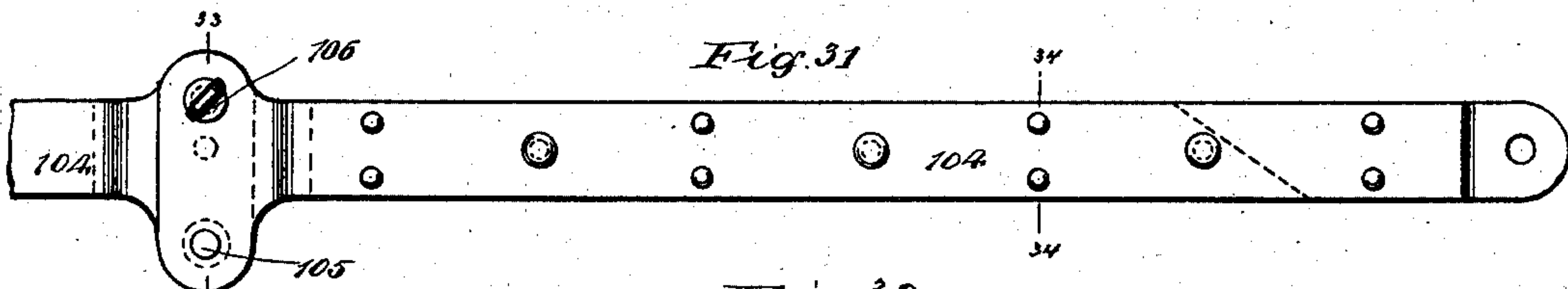


Fig. 39

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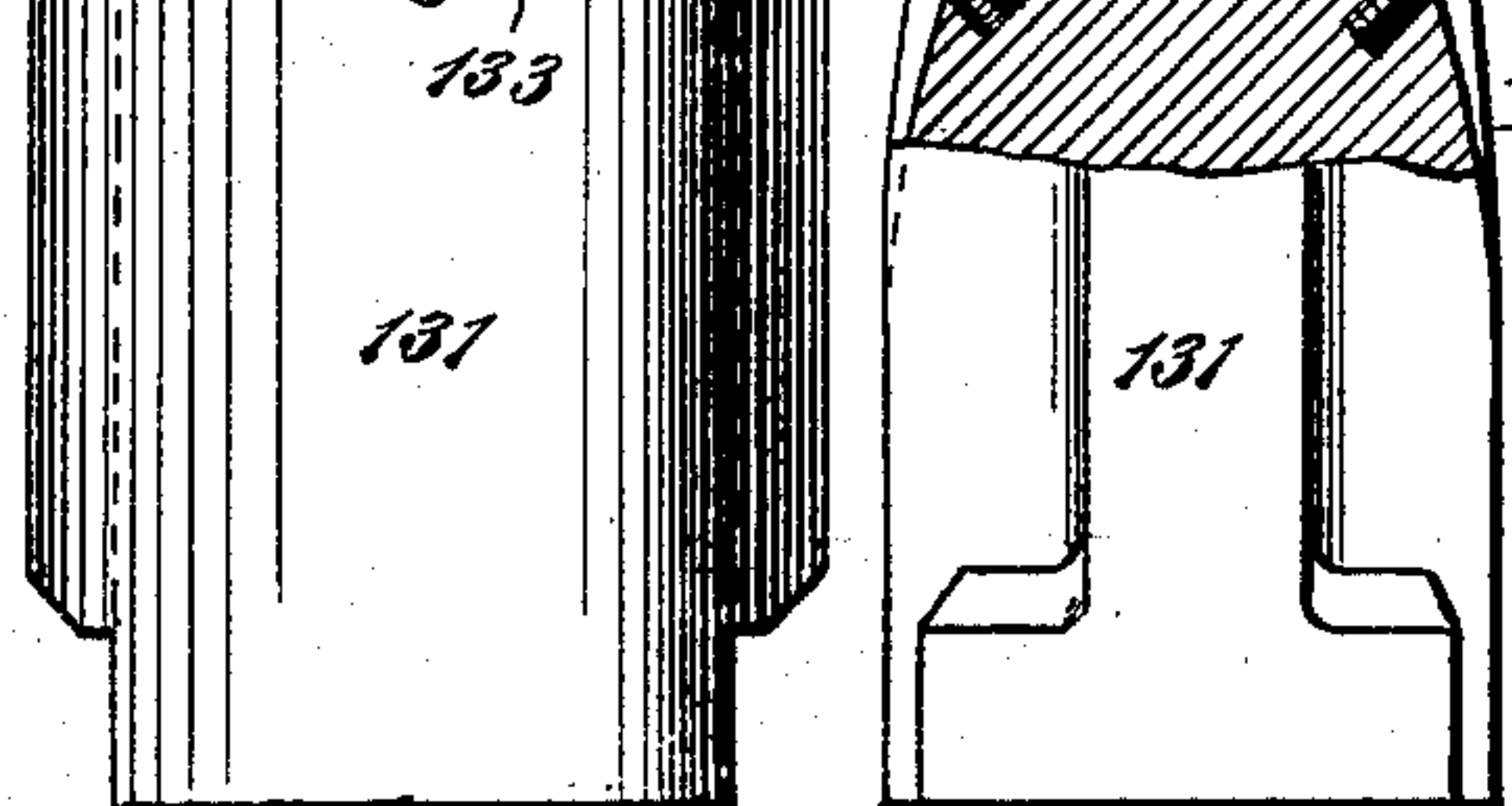


Fig. 40

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# UNITED STATES PATENT OFFICE.

WILLIS E. SMITH, OF GREENBAY, WISCONSIN, ASSIGNOR OF ONE-HALF TO  
GILMAN W. SMITH, OF CHICAGO, ILLINOIS.

## PILE-DRIVER.

SPECIFICATION forming part of Letters Patent No. 671,242, dated April 2, 1901.

Application filed January 5, 1900. Serial No. 445. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIS E. SMITH, a citizen of the United States, and a resident of Greenbay, in the county of Brown and State of Wisconsin, have invented a new and Improved Pile-Driver, of which the following is a full, clear, and exact description.

This invention relates to a pile-driver for use in railway-work, the apparatus being mounted on a car to be moved from place to place along the railway; and the invention embodies a carriage which is mounted to move longitudinally on the railway-car and on which a deck is mounted to turn, the deck carrying the pile-driver proper, which is of peculiar construction, enabling it to be folded when not in use, and also enabling the leaders to be slued or turned sidewise, adapting the pile-driver to all sorts of work required in railway construction. By providing the longitudinally-adjustable carriage or platform the pile-driver may be adjusted longitudinally with respect to the car on which it is mounted and by providing the deck arranged to turn on the carriage the pile-driver may be adjusted to work at either side of the railway-car.

This specification is the disclosure of one form of my invention, while the claims define the actual scope thereof.

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 views.

Figure 1 is a side elevation of the complete apparatus, showing its parts in operative position. Fig. 2 is a side elevation showing the pile-driver folded into inoperative position. Fig. 3 is a front elevation of the apparatus in operative position. Fig. 4 is an enlarged rear elevation of the sheaves at the head of the leaders. Fig. 5 is an enlarged side elevation of such parts. Fig. 6 is a skeleton-like view showing in plan the deck and the gearing thereon. Fig. 7 is a skeleton-like view showing in plan the carriage or platform and parts of the gearing thereof. Fig. 8 is an enlarged section of the means at the center of the deck for advancing the carriage or platform on the railway-car. Fig. 9 is a section on the line 9 9 of Fig. 8. Fig. 10 is a plan view of the parts shown in Figs. 8 and 9.

Fig. 11 is a sectional view on the line 11 11 in Fig. 13 of the gearing for driving the parts shown in Figs. 8, 9, and 10. Fig. 12 is a section on the line 12 12 of Fig. 11. Fig. 13 is a plan view of the gearing shown in Figs. 11 and 12. Fig. 14 is a vertical section of the means for operating the gearing shown in Fig. 11. Fig. 15 is a section on the line 15 15 of Fig. 14. Fig. 16 is a plan view of the hand-lever shown in Fig. 14. Fig. 17 is an enlarged section showing the fastening of the collar to the rod for operating the clutch of the gearing shown in Figs. 8, 9, and 10. Fig. 18 is a plan view of the gearing for turning the deck on the carriage. Fig. 19 is a side elevation thereof. Fig. 20 is a plan view of the auxiliary gearing for turning the deck on the carriage. Fig. 21 is a side view thereof. Fig. 22 is an end view with parts in section. Fig. 23 is a fragmentary side view of the leaders, showing their connection with the rocking tower. Fig. 24 is a rear view of the same parts. Fig. 25 is a section on the line 25 25 of Fig. 24. Fig. 26 is a section on the line 26 26 of Fig. 24. Fig. 27 is a detail section on the line 27 27 of Fig. 24 of the parts by which the leaders are mounted on the tower. Fig. 28 is a front elevation of the deck and the lower portion of the leaders, showing the means for holding them at the desired lateral adjustment. Fig. 29 is a vertical section of these parts. Fig. 30 is a sectional plan on the line 30 30 of Fig. 29. Fig. 31 is a fragmentary side view of one of the side braces. Fig. 32 is a fragmentary rear view of the same. Fig. 33 is a section on the line 33 33 of Fig. 31. Fig. 34 is a section on the line 34 34 of Fig. 31. Fig. 35 is a fragmentary side view of the toggle-links forming part of the ladder by which to reach the platform on the base of the rocking tower. Fig. 36 is a fragmentary rear view of the same parts. Fig. 37 is a fragmentary side view of a jack employed in connection with a truck of the railway-car. Fig. 38 is a sectional view on the line 38 38 of Fig. 37. Fig. 39 is a front view of the pile-driver hammer, and Fig. 40 is a side view of the same element with a part in section.

As illustrated best in Figs. 1, 2, and 3, the various parts of my invention are mounted on a flat car A, which may be of any desired



construction provided, with the usual brake and coupler mechanism, the longitudinally-adjustable carriage or platform B, mounted on top of the body of the car A, and the deck C, mounted on the carriage to turn on a centrally-located axis. The pile-driver tower D is mounted at one end of the deck C, and the caboose E is mounted at the other end, it being understood that the caboose is arranged to contain the hoisting mechanism for operating the pile-driver. The leaders F of the pile-driver are mounted on the rocking tower D. By this arrangement the carriage B may be moved longitudinally on the car A to project the leaders F out beyond the end of the car. The deck C may be turned on its centrally-disposed axis to project the leaders F to either side of the car, or, if necessary, to carry the leaders completely around to the other end of the car. The rocking tower D may be thrown down to the position shown in Fig. 2, thus folding the leaders when not in use, and the leaders F, being pivotally mounted on the tower D, may be turned or slued sidewise from the perpendicular position shown in Fig. 3; so as to place the leaders diagonally and permit the driving of the piles at the side of the track, although the deck C may be disposed longitudinally with respect to the car A.

As shown best in Figs. 6 and 7, the car A is provided with a number of longitudinally-disposed tracks 41, mounted on the top thereof, on which travel the rollers 42 of the carriage B, by which means the carriage is mounted to move in the manner explained. Fastened at its ends to the car A, between the middle sills thereof, is a longitudinally-extending stationary chain 43, with which works a pinion 44, fastened rigidly on a shaft 45, mounted, as will be hereinafter described, in the carriage B and deck C and forming the axis around which said deck turns to effect the adjustments mentioned. The rotation of the shaft 45 causing the pinion 44 to work with the chain 43 will advance the carriage B and deck C in unison longitudinally along the car A. As shown best in Figs. 8, 9, and 10, the shaft 45 is mounted to turn freely in a bearing 46, which is fastened rigidly between two sills of the carriage B and which not only serves as a bearing for the shaft 45, but also as a pivot member fitting loosely in a corresponding member 47, fastened rigidly to two sills of the deck C. These members 46 and 47 being respectively carried rigidly on the carriage B and deck C and being engaged with each other, as shown in Figs. 8 and 9, form the pivot around which the deck C turns, thus relieving the shaft 45 of undue strain. The pinion 44 is fastened to the shaft 45 below the bearing 46, and the upper end of the shaft 45 is held to turn in a yoke-bearing 48, attached to the deck C. Mounted loosely on the shaft 45 above the bearing 46 is a sprocket-wheel 49, having a clutch member 50 formed at the upper end of its hub,

which is adapted to work with a corresponding clutch member 51, splined on the shaft 45 and situated just below the yoke-bearing 48. When the members 50 and 51 are engaged, the sprocket-wheel 49 will be rendered fast on the shaft 45 and the movement of the wheel 49 will be transmitted to the shaft and thence to the pinion 44, thus advancing the carriage on the car, as explained. An angle-plate 52 may, if desired, be mounted on one of the sills of the car A, as shown in Figs. 8 and 9, to support the chain 43, and to hold the chain in position to be properly engaged by the pinion 44. I provide guide-plates 53, attached rigidly to the bearing 46 and extending down alongside of the chain, (see Fig. 8,) and a guide roller or wheel 54, mounted on a stub-shaft attached to the bearing 46. (See Fig. 7.)

An endless chain 55 (see Figs. 6 and 10) passes around the sprocket-wheel 49 and is held properly in engagement therewith by guide-rollers 56, attached to the sills of the deck C, as shown. This chain 55 passes forwardly toward the tower D to a point just beyond the adjacent end of the carriage B and then passes around a sprocket-wheel 57, mounted on a shaft 58, journaled in bearings 59, attached to the deck C. This shaft 58 imparts movement to the chain 55, thus to drive the shaft 45, as explained. The upper end of the shaft 58 projects above the deck C, as shown in Fig. 11, and is provided with a spur-gear 60, fast thereon and meshed with a pinion 61, secured fast to a shaft 62, which is mounted to turn loosely in bearings 63, also carried by the deck C. The shaft 62 is the primary movement or drive shaft, to which is applied power for advancing the carriage B on the car A. This shaft 62, as best shown in Figs. 14, 15, 16, and 17 and as also shown in Fig. 11, is provided with a longitudinally-disposed keyway in which fits a sliding rod 64. The lower end of this rod is fastened to a collar 65, situated between the bearings 63 and sliding on the shaft 62. The shaft 62, above the top of the deck C, has a drum 66 fast thereon, and the upper end of the shaft 62, above the drum, has a collar 67 secured rigidly thereon. On this collar a yoke 68 is mounted loosely, and the yoke 68 carries the fulcrum of a hand-lever 69, by which manual power may be imparted to the shaft 62. This hand-lever 69 has an enlarged portion 70, (best shown in Fig. 16,) with a rectangular opening 71 therein, which is adapted to receive the squared upper end of the shaft 62, such squared upper end being located out of the longitudinal center of the shaft, as shown in Fig. 16. When the lever 69 is thrown up to the position shown in full lines in Fig. 14, it is disengaged from the shaft 62, and movement will not be imparted from one to the other; but when the lever is thrown down to the position indicated by dotted lines in Fig. 14 and by full lines in Fig. 16 a turning movement of the lever 69 will be imparted



to the shaft 62 also to turn the shaft. A balance-weight 72 may be attached to the lever 69, if desired, by which to normally hold it in the raised position shown by full lines. The drum 66 is used as a means of driving the shaft 62 from the engine in the caboose E, which is effected by rope transmission from the engine therein, as will be understood.

When the lever 69 is thrown down, as indicated by the dotted lines in Fig. 14, the under side of the enlargement 70 of such lever will strike the upper end of the sliding rod 64 and throw the collar 65 down to the position indicated by dotted lines in Fig. 14. As shown in Fig. 11, the collar 65 engages the forked end of a bell-crank lever 73, which lever is fulcrumed on a part of the deck C adjacent to the lower of the bearings 63. The bell-crank lever 73 has pivotal connection at its other end with a rod 74, which runs rearward to the center of the car and is connected at its other end to a bell-crank lever 75, fulcrumed on the bearing 48 and engaged with the clutch member 51, as shown. (See Fig. 8.) An expansive spiral spring 76 bears between a transverse bar 77 on the deck C and the rear or central end of the rod 74 and tends normally to throw the lever 75 to the position shown in Fig. 8, in which position the clutch member 51 will be out of engagement with the clutch member 50. This position of disengagement on the part of the clutch member 51 is coincident with the raised position of the arm 69 in Fig. 14 and consequently with the raised position of the collar 65 in such view. When, therefore, the lever 69 is thrown down to engage the opening 71 with the squared upper end of the shaft 62, the rod 64 is also moved down, thus throwing the collar 65 and the bell-crank lever 73. This throws the rod 74 and the lever 75 and moves the clutch member 51 downward into engagement with the clutch member 50. It will thus be seen that normally the gear for advancing the carriage on the car is disengaged and that when it is desired to move the carriage on the car the lever 69 should be thrown down, thus engaging the clutch members 50 and 51, and then the shaft 62 may be driven by power through the drum 66 or manually through the lever 69. If desired, a suitable gear-case 78 may be provided for the gears 60 and 61. (See Figs. 11, 12, and 13.) In connection with this mechanism it is explained that the hoisting-engine within the caboose E is the most convenient means of driving the sprocket-pinion 44, which is effected by a rope turned several times around the drum 66 and the drum of the engine. In sliding the carrier B it is desirable to effect the greatest nicety of adjustment, so that the pile-hammer will properly strike the pile, and to effect this it is necessary instantly to stop the movement of the carriage when its proper position has been attained. Therefore in stopping this movement of the carriage I do not depend upon the stoppage of the whole

train of gearing from the engine to the chain 43; but, on the contrary, I provide the peculiar clutch mechanism explained above, by which the carriage-driving movement may be instantly stopped directly at its point of application—*i. e.*, at the sprocket 44—irrespective of the operation of the engine, the stoppage of which latter may be more or less delayed. In using this mechanism with the engine as a driving source the lever 69 is thrown down to engage the clutch members, and the engine-power being applied to the drum an attendant holding the lever 69 in horizontal position moves around with the lever as the shaft 62 and the lever turn. The instant that the carriage is in the proper position the lever 69 is thrown up, which disengages the clutch members and stops the movement of the carriage, although the movement of the train of gear between the element 49 and the engine may not be arrested for several moments later. The shaft 62, with its attached parts, is placed somewhat distant from the shaft 45 for the convenience of the workmen, especially to enable them to see when the pile-hammer is in position properly to strike the pile. Further, it should be noted that in this connection power must be applied from the deck (which swings on a vertical axis) to the carriage, which is stationary with respect to the deck.

As shown in Fig. 7, the carriage B is provided with two annuli 79 and 80, concentric with each other and spaced apart, so as to carry antifriction-rollers 81 between them. The outer annulus 80 is exteriorly toothed throughout its periphery, and the diameter of this annulus is approximately equal to the width of the carriage B and car A. The deck C has an annular plate or fifth-wheel 82 attached to the under side thereof, and this fifth-wheel bears over the annuli 79 and 80 and on the antifriction-wheels 81, so that as the deck C turns around the center of the shaft 45 and bearings 46 and 47 the fifth-wheel 82 will ride on the wheels 81. As illustrated best in Figs. 18 and 19, a pinion 83 is meshed with the toothed annulus 80 and is carried fast on a revoluble shaft 84, held in bearings 85 and 86 on the deck C. This shaft 84 is provided at a point between the bearings 85 and 86 with a fixed spur-gear 87, which meshes with a pinion 88, fixed on a shaft 89, which is revolubly mounted in the bearings 85 and 86, it being understood that these bearings are of duplex construction, so as to carry both of the shafts 84 and 89. The shaft 89 projects up above the deck C for a convenient distance and has its upper end adapted to receive a ratchet-lever or any other suitable appliance for manually causing a rotary movement of the shaft 89. This rotary movement of the shaft 89 drives the shaft 84, and such latter shaft through the gears 83 and 80 causes the deck C to be turned from side to side on the carriage B and independently thereof.

As indicated in Fig. 1, each end of the car-



rier B is provided with a toothed segment 90. Fig. 7 shows one of these segments in plan view. Adjacent to each toothed segment 90 a segmental beam 91 is secured, and between these parts 90 and 91 antifriction-rollers 92 are mounted. Each end portion of the deck C is provided with a segmental runner 93, and these runners 93 respectively cover the paths of the segments 91 and 90 and bear on the rollers 92, by which arrangement the end portions of the deck C are mounted to roll on the ends of the carriage B. As shown in Fig. 6, the front end portion of the deck C is provided at each side with a vertical shaft 94, which shafts are mounted to turn in bearings 95 and 96, attached to the deck C, as shown best in Figs. 21 and 22. These shafts 94 carry at their lower ends pinions 97, which are capable of meshing with either one of the toothed segments 90, according to the position in which the deck C is placed. As shown in Figs. 1 and 7, the gears 97 are in mesh with the toothed segment 90 at the right-hand end of the carriage B; but should the deck C be turned for one-half revolution to reverse the position of the parts B and E it is clear that the gears will mesh with the left-hand segment 90. The upper ends of the shafts are, as the shaft 89, adapted to work with suitable rotary levers or other mechanism for manually driving the shafts 94. These parts 90, 97, and 94 furnish an auxiliary means for turning the deck C on the carriage B, which auxiliary means may operate until the gears 97 run out of mesh with the adjacent segment 90. When this operation takes place, it is obvious that the pinion 83 must be brought into operation.

From the foregoing description it will be apparent how the deck C and carriage B are adjusted on the car A. I shall now describe the parts D and F and the manner of mounting and operating the same. Laid on the right-hand end of the deck C, at each side thereof, is a track-bar 98, which bars are disposed longitudinally of the deck and are provided with studs 99, projecting outward from the sides thereof. (See Figs. 1, 6, 20, 21, and 22.) On these tracks 98 rockers 100 respectively work, the rockers being provided with notches receiving the pins 99 and being capable of rolling forward to the position shown in Fig. 1 or of rolling rearward to the position shown in Fig. 2. The rockers 100 are rigidly attached to the base of the tower D by means of braces 101 and also by means of beams 102, which beams form the joists of a platform 103, which extends between the outer ends of the rockers 100 and the tower D and which when the tower D is thrown to the position shown in Fig. 1 forms a platform or auxiliary deck on which workmen may stand, if desired. The outer ends of the rockers 100 are provided with folding braces for holding them in the position shown in Fig. 1, which braces each comprise jointed members 104. (See Figs. 1, 2, 31, 32, 33, and

34.) These members 104 are respectively joined in pairs by pivot-pins 105, so that they may swing to the position shown in Fig. 1 or to that shown in Fig. 2. For holding the members 104 in the position shown in Fig. 1 I provide a removable pin 106, which when in place, as shown in Figs. 1, 31, and 32, will hold the parts rigid and which when removed permits the parts to swing to the position shown in Fig. 2. One of the back-braces, composed of the parts 104, forms part of a folding ladder, which (see Figs. 35 and 36) comprises rungs 107, rigidly attached to the members 104 and extending inward therefrom, the inner ends of the rungs 107 being attached to bars 108, mounted to work in unison with the parts 104, as shown in Fig. 35, it being understood that with respect to these bars 108 the removable pin 106 of the parts 104 is unnecessary. The tower D, as shown in Figs. 1, 2, 23, 24, and 25, may be of any desired construction to secure the proper structure and rigidity thereof, and the rockers 100 form, as will be seen, a part of this structure. Braces 109 are provided between the upper end of the tower D and the outer ends of the rockers 100, and these braces may also be provided with rungs to form a ladder by which to permit workmen to ascend to the head of the tower.

The two leaders F of the pile-driver are held in parallelism with each other and rigidly connected together by various fastenings extending transversely between them, as will be hereinafter described. Intermediate the ends of the leaders F, but at a point above the middles thereof, is fastened rigidly a pivot-bearing section 111, which works in a coacting section 112, mounted on the head of the tower D, the sections being held together by a pin 112<sup>a</sup>, (see Fig. 27,) by which means the leaders are supported on the tower and are mounted to swing on a horizontal axis from one side to the other of the perpendicular position shown in Fig. 1. As shown in Figs. 28, 29, and 30, the lower extremities of the leaders F project down to a point just below the body of the car A, and the lower portions of the leaders are provided with a runner 113, which is fastened rigidly to the leaders and extends between them, at the rear side thereof, and which is curved in the arc of a circle to ride on a correspondingly-curved track-plate 114, fastened to the end sill 115 of the deck C. The arc of the runner 113 and the track 114 is struck from the center of the pivot-sections 111 and 112, so that as the leaders are slued from side to side the runner 113 rides on the track-plate 114 and forms a secure bearing for the lower ends of the leaders. These parts 113 and 114 are perforated, as shown, and a pin 116 is provided by which to lock the parts 113 and 114 in the desired position.

Above the bearing-piece 111 the leaders F are provided with a ladder 117, extending up the head thereof. At a point intermediate



the bearing 111 and the head of the leaders a yoke 118 is attached rigidly to the leaders, extending between them at the rear thereof, so as not to interfere with the movement of the hammer between the leaders. This yoke 118 serves not only to brace the leaders F against each other, but also to form a bearing for a rocking chock-plate 119, which is mounted on the yoke 118 and provided with an arm 120, to which a line may be attached, so as to raise the chock-plate from its normal position, as shown by full lines in Fig. 23, to the position indicated by the dotted lines in Fig. 23, in which former position the chock-plate may serve as a support for the pile-hammer and in which latter position the chock-plate will not interfere with the movement of the hammer. This device is useful when it is desired to support the hammer independently of the jerk-rope or hammer-line by which the hammer is operated. Fig. 1 illustrates the chock-plate 119 as serving to support the hammer, which will be hereinafter described in detail. At the head of the leaders F a cross-brace 121 of any desired form is mounted rigidly, and on this cross-brace in suitable bearings are mounted a sheave 122 for the hammer-line and a sheave 123 for the pile-line. A rope-guard 124 is provided for the sheave 122 and a hood 125 is provided for the sheave 123. The journals of the sheave 122 are provided with oil-boxes 126, which have their feed-openings disposed diagonally, as shown, so as to avoid spilling the oil when the leaders are moved from the position shown in Fig. 1 to that shown in Fig. 2. As shown in Fig. 1, the hammer-line 127, passing over the sheave 122, passes down over a sheave 128, mounted on the platform 103 of the rockers 100, and thence to the caboose E, as shown. The pile-line 130, passing over the sheave 123, extends down to a sheave 129, mounted alongside the sheave 128, and from this sheave the pile-line passes into the caboose E to the engine. The pile-hammer 131 is grooved at its sides to fit between the leaders F and to operate in the usual manner. As shown in Figs. 39 and 40, this hammer has an opening 132 cast therein, to which the hammer-line may be attached directly and without the use of a shackle or the like. The hammer may also be provided with pins 133, to which ropes may be attached to secure the hammer when desired. The operation of the hammer in this apparatus is the same as of those heretofore used and will be fully understood. In operating the leaders F to throw them from active to inactive position the hammer and pile lines may be employed to steady and otherwise assist in moving the leaders. It should be understood that by providing the rockers 100, as described, the parts D and F are so nicely balanced on the deck C that the leaders may be handled by manual power alone. The hammer should of course be placed on the leaders so as to properly balance the same when the folding or unfolding

operation is to be effected. The leaders are provided with hammer-chocks 134 in the form of double hooks, as shown, and pivotally mounted on the leaders. (See Figs. 1, 2, 28, 29, and 30.) These chocks serve, as usual, to support beams which extend beneath the hammer, and thus hold the hammer independently of the hammer-line. By pivotally mounting the chocks 134 they may be swung to various positions (see Figs. 1 and 2) and will not constitute an inconvenience in handling the folding leaders and tower.

During the operation of the pile-driver it will be frequently desired to render the body of the car A rigid on the trucks thereof and to prevent the wobbling of the car sidewise on the center pins of the trucks. This end I accomplish by jacking up the body of the car by the means shown in Figs. 37 and 38, which means are applied one to each side of each truck, each of which means comprises a yoke 135, fastened to the ends of the transoms of the truck, as shown. In each yoke works a jack-screw 136, and the heads of these jack-screws are designed to work against suitable castings 137, attached to the body of the car. By these arrangements the body of the car may be supported rigidly on the trucks and all wobbling or rocking prevented, so that a perfectly rigid support is provided for the pile-driving mechanism.

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

1. The combination with a railway-car, of a carriage mounted to move thereon, a deck mounted to turn on a vertical axis on the carriage, a segmental gear attached to each end of the carriage, and a pinion mounted on the deck and adapted to mesh with either one of the segmental gears.

2. The combination with a railway-car, of a carriage mounted to move thereon, a chain attached to the car, a deck mounted to turn on the carriage, a revoluble shaft coincident with the axis of movement of the deck on the carriage, a gear attached to the shaft below the carriage and meshing with the chain, a sprocket-wheel attached to the shaft above the carriage, an endless sprocket-chain passed around the sprocket-wheel, a driving-shaft, and a sprocket-wheel driven thereby and around which wheel the endless sprocket-chain also passes.

3. The combination of a drive-shaft, a sprocket-wheel driven thereby, a driven shaft, a sprocket-wheel mounted loosely thereon and having a clutch member attached, a chain passing between the two sprocket-wheels, a clutch member splined on the driven shaft and working with the clutch member of the second-named sprocket-wheel, means for operating the drive-shaft, and a connection between the said means and the clutch member by which to throw the clutch member into action when the drive-shaft is operated.

4. The combination of a revoluble shaft



having a keyway therein, a sliding rod mounted in the keyway, a hand-lever mounted on the shaft and adapted to engage the same to turn the shaft, the hand-lever also engaging the rod to slide it in the keyway, gearing driven by the shaft, a clutch commanding such gearing, and a connection between the sliding rod and the clutch.

5. The combination of a revoluble drive-shaft having a keyway therein, a rod mounted to slide in the keyway, a collar sliding on the shaft and having the rod attached thereto, means for turning the shaft, such means being arranged to strike the rod and slide the same when the said means is engaged with the shaft, an elbow-lever engaged with the collar and moved thereby, gearing driven from the drive-shaft, a clutch commanding said gearing, and a connection between the clutch and the elbow-lever.

6. The combination of a revolubly-mounted shaft, gearing driven thereby, a clutch commanding the gearing, a rod turning with the shaft and slidable relatively thereto, a connection between the said rod and the clutch to control the clutch, and means for imparting movement to the shaft, such means when engaging with the shaft serving to slide the rod and throw the clutch.

7. The combination of a revoluble shaft, a rod mounted to turn therewith and sliding independently thereof, means for operating the rod, gearing driven by the shaft, a clutch commanding the gearing, and a connection between the clutch and rod.

8. The combination of a revoluble shaft, means for imparting movement thereto, a rod turning with the shaft and sliding relatively thereto, and caused to slide by the operation of the said means for imparting movement to the shaft, gearing driven by the shaft, a clutch commanding the gearing, and a connection between the clutch and the said rod.

9. The combination of a revoluble shaft, a hand-lever adapted to engage the same to impart movement thereto, a rod mounted to turn with the shaft and to slide independently thereof, the hand-lever serving to slide the rod on the shaft, gearing driven by the shaft, a clutch commanding the gearing, and a connection between the clutch and the rod.

10. The combination of a revoluble shaft adapted to be driven, a rod turning therewith and sliding relatively thereto, mechanism driven by the shaft, a clutch controlling such mechanism, and a connection between the rod and the clutch.

11. The combination of a railway-car, a chain attached thereto, a carriage mounted to move on the railway-car, a deck mounted to turn on the carriage, a shaft mounted in the deck and carriage coincident with the axis of movement of the deck on the carriage, a gear attached to the shaft and meshing with the chain to advance the carriage on the car, a sprocket-wheel mounted loosely on the shaft, a clutch serving to fix the sprocket-

wheel to the shaft, a drive-shaft, a sprocket-wheel driven thereby, an endless chain passing between the two sprocket-wheels, means for imparting movement to the drive-shaft, and a connection between the said means and the clutch for operating the clutch simultaneously with the action of the said means for imparting movement to the shaft.

12. In a pile-driver, the combination of a support, a rocking tower mounted thereon, and leaders mounted to swing sidewise on the rocking tower, permitting the leaders to be slued from one side to the other of the perpendicular, for the purpose described, the leaders folding with the tower into inactive position.

13. In a pile-driver, the combination with a support having a track thereon, of a tower, a rocker attached to the tower and rolling on the track, and leaders mounted on the tower.

14. The combination with a support, of a tower, a rocker attached to the tower and rolling on the support, and a jointed brace extending between the rocker and the support.

15. In a pile-driver, the combination with a support, of tracks mounted thereon, a tower, rockers attached to the tower and forming part of the base thereof, the rockers being mounted to roll on the tracks, leaders attached to the tower, and a jointed brace extending between the rockers and the support.

16. The combination with a railway-car, of a carriage mounted to move longitudinally thereon, gearing for driving the carriage, a deck mounted to turn on the carriage, gearing for driving the deck, a rocker attached to the tower and forming part of the base thereof, the rocker being mounted to roll on the deck, means for holding the rocker and tower in raised position, and leaders carried by the tower.

17. The combination with a railway-car, of a rocking tower supported thereon, means for holding the tower in raised position, and leaders pivoted on and carried by the tower.

18. The combination with a railway-car, of a carriage mounted to move thereon, a deck mounted to turn on the carriage, a tower mounted to rock on the deck, leaders pivoted on and carried by the tower, and a platform also carried on the tower.

19. In a pile-driver, the combination with the leaders, of a pivoted chock-hook mounted thereon to swing transversely of the longitudinal line of the chock-hook.

20. In a pile-driver, the combination with the leaders, of a yoke extending between them, and a chock-plate pivoted on the yoke to swing in and out of the path of the hammer.

21. In a pile-driver, the combination with a support and with leaders mounted to swing, of a runner attached to the leaders, a track-plate on which the runner moves, and means for adjustably fastening the runner on the track-plate.

22. The combination of a railway-car, a carriage mounted to move thereon, a deck



mounted to turn on the carriage, gearing sit-  
uate approximately at the center of the deck,  
to turn the same, a segmental gear attached  
to the carriage adjacent to the end thereof,  
5 and a pinion mounted on the deck near one  
end thereof and adapted to mesh with the  
segmental gear, to turn the deck.

23. The combination with a railway-car, of  
a carriage mounted to slide thereon, a deck  
10 mounted on the carriage, a pile-driving mech-  
anism carried by the deck, the pile-driving  
mechanism comprising leaders capable of be-

ing slued from side to side, and a track-plate  
engaged by a part of the pile-driving mech-  
anism, such track-plate being supported at 15  
one end of the carriage.

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

WILLIS E. SMITH.

Witnesses:

W. P. WAGNER,  
P. R. KENDALL.