

(No Model.)

4 Sheets—Sheet 1.

A. BOX.
AUTOMATIC STOKER.

No. 549,868.

Patented Nov. 12, 1895.

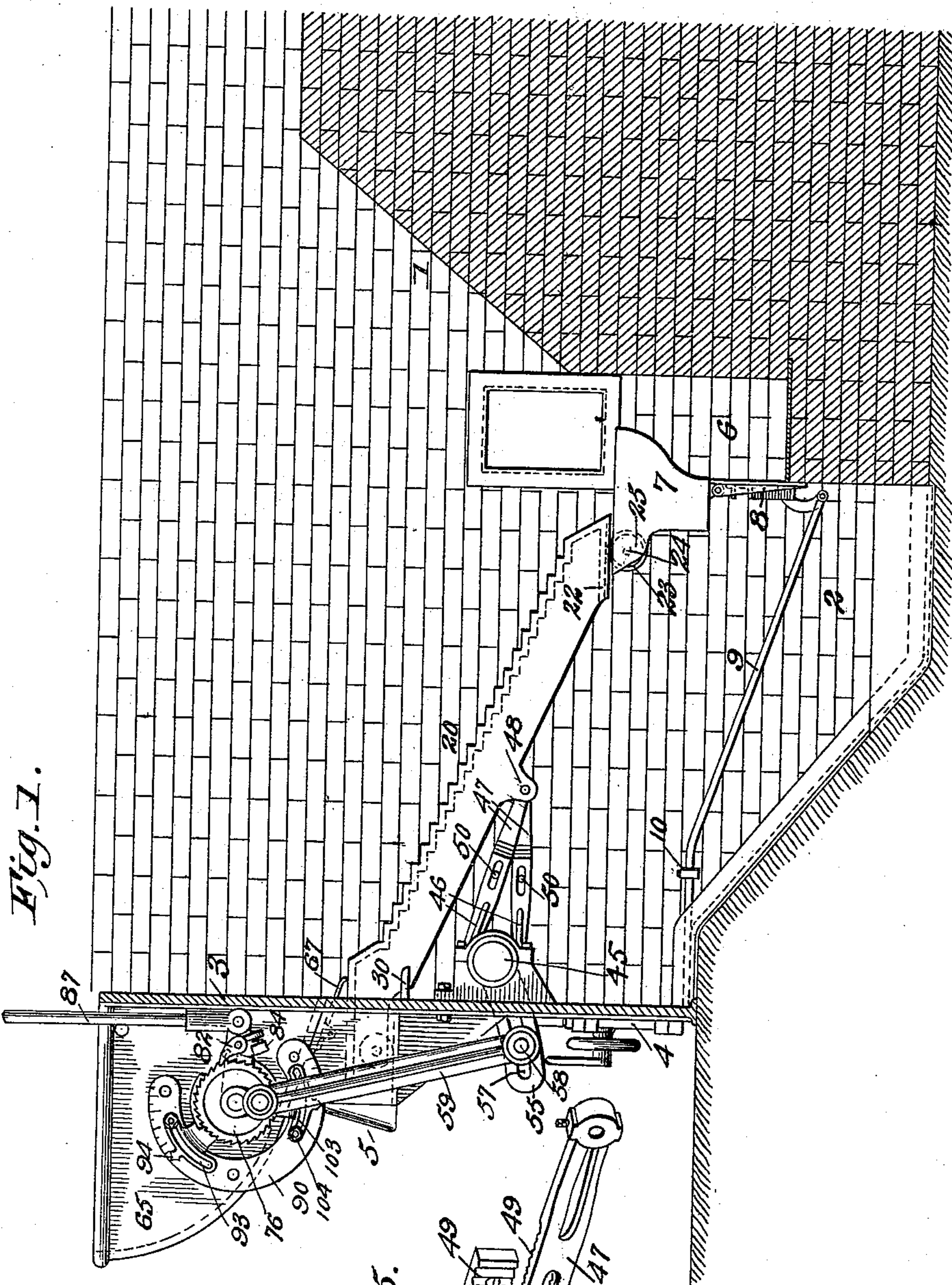
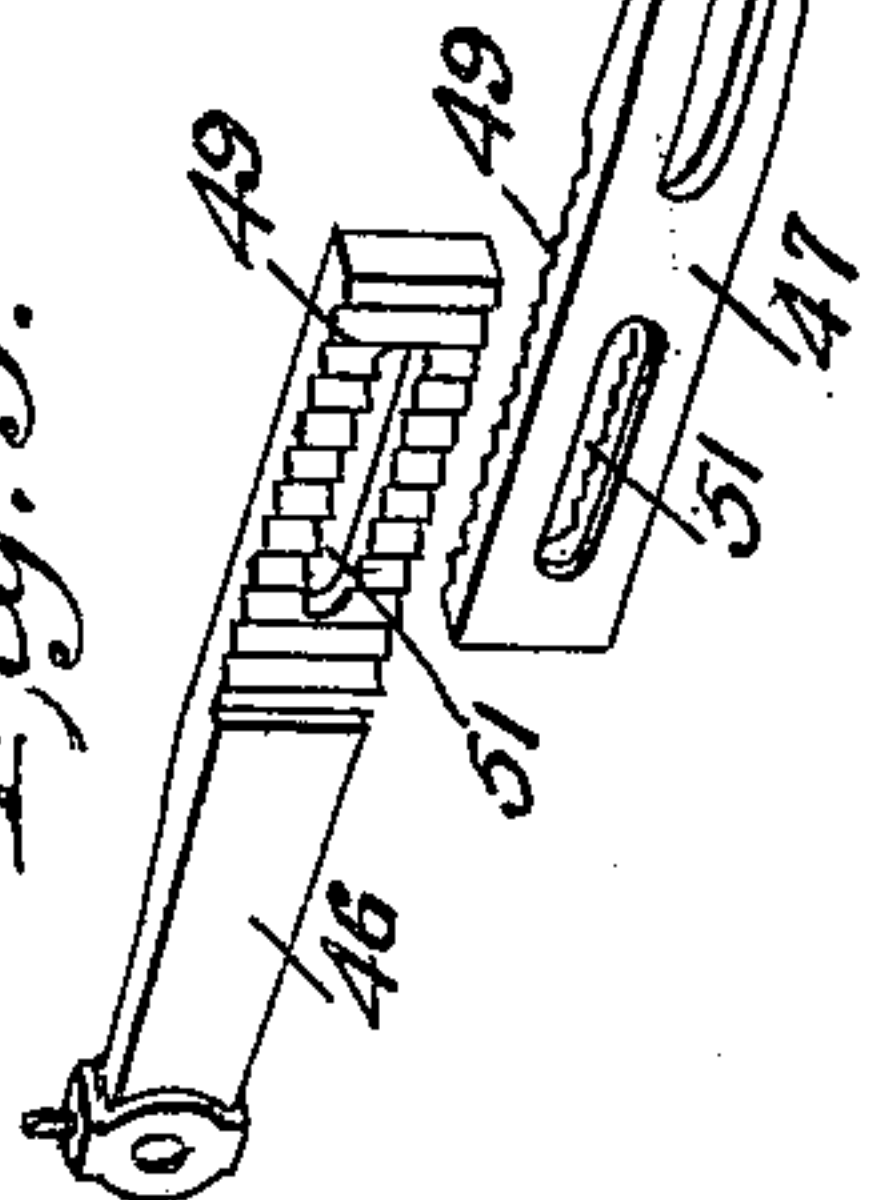


Fig. 1.

WITNESSES:

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Fig. 5.



INVENTOR

Alfred Box.

BY

Knight Bros.
ATTORNEYS.

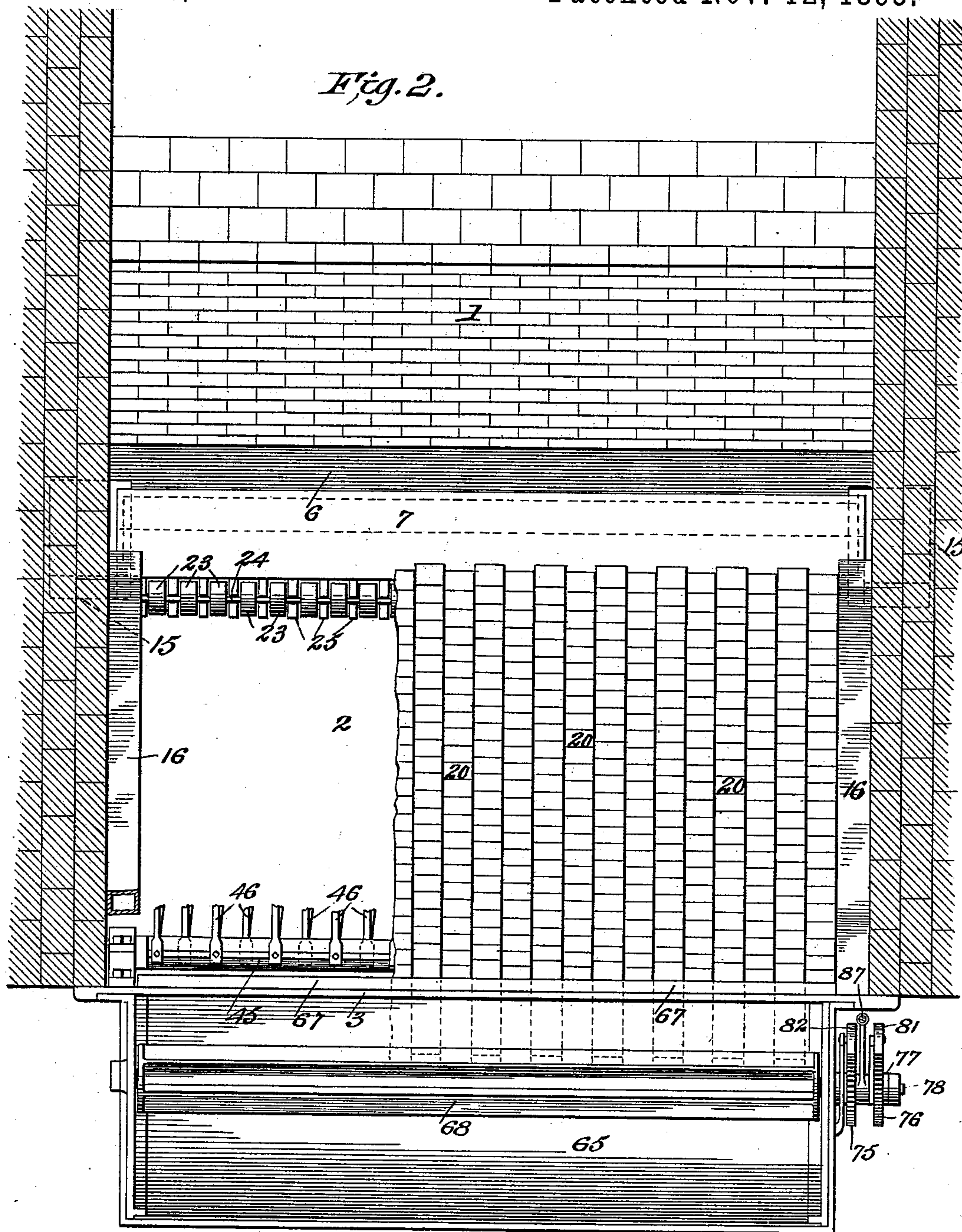
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Fig. 4.

Fig. 3.

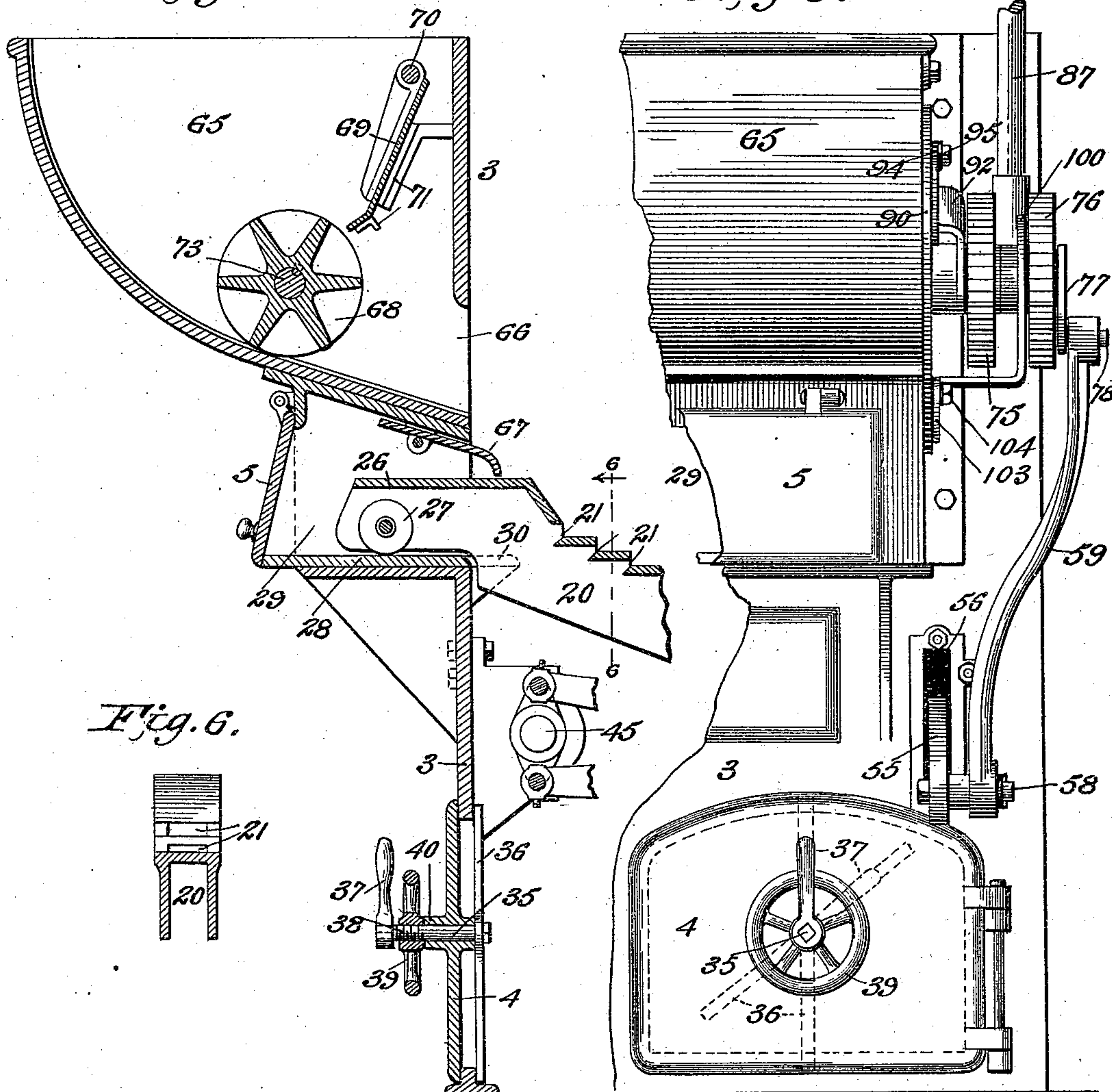


Fig. 7.

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Fig. 8.

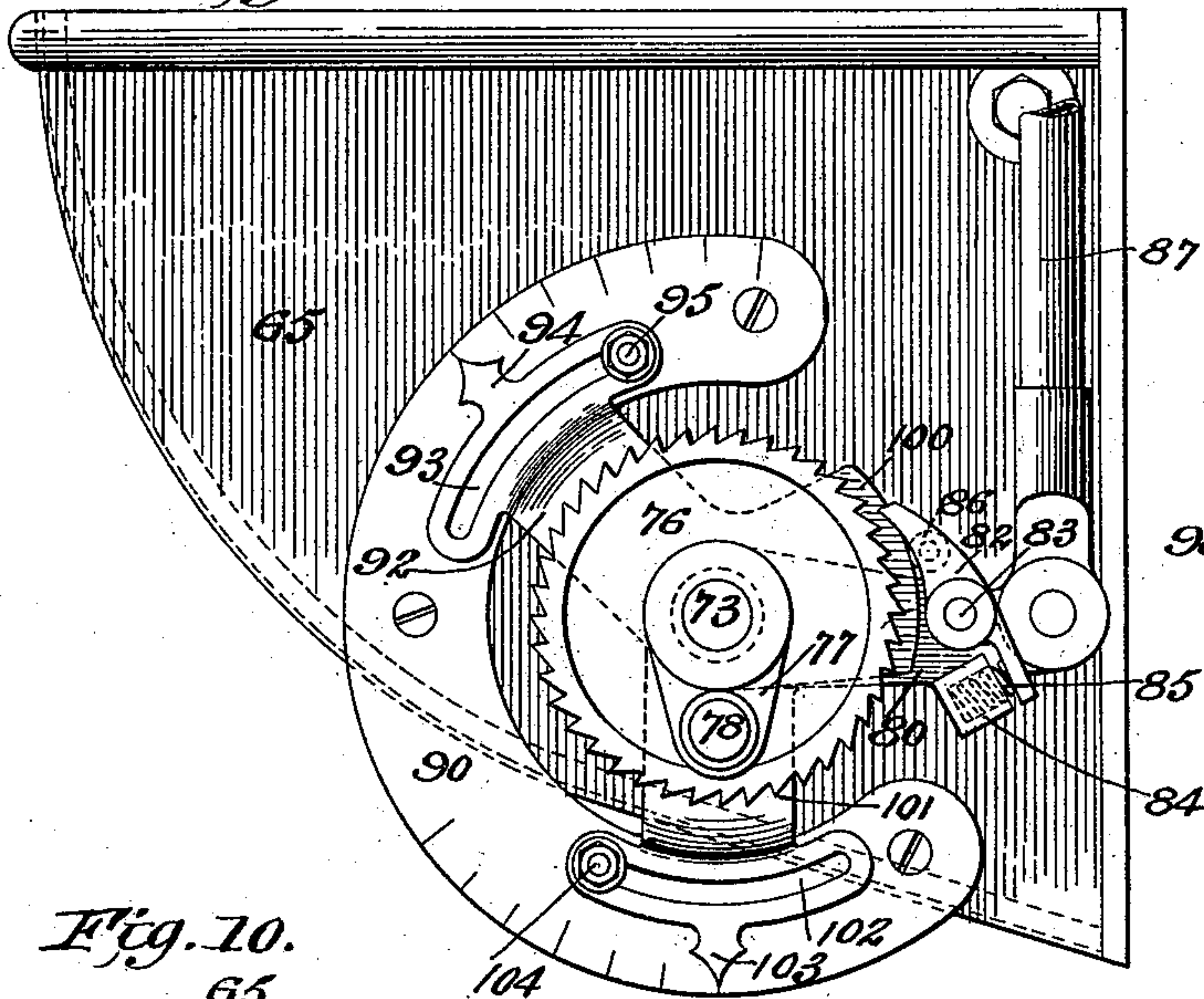


Fig. 9.

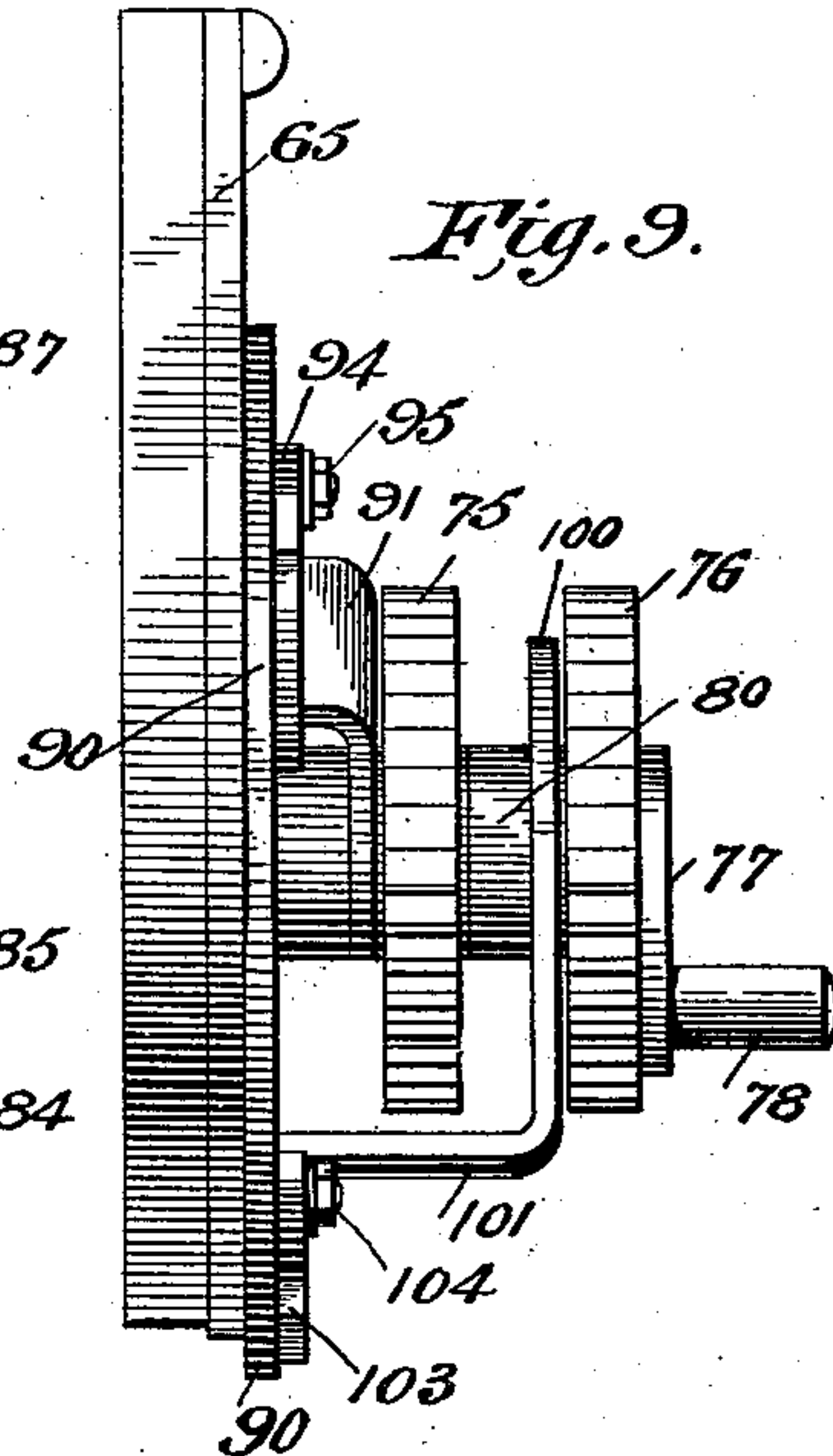


Fig. 10.

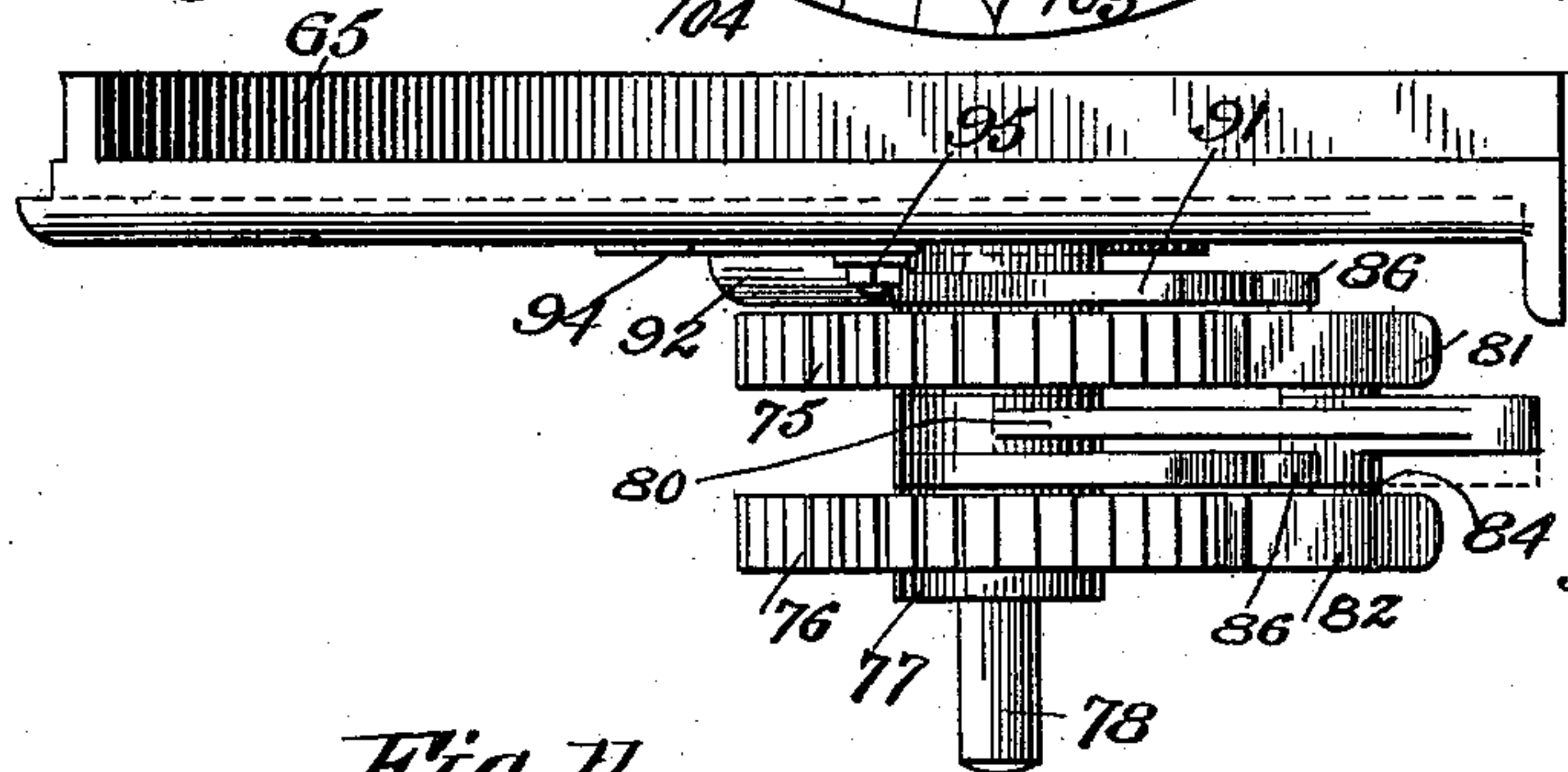


Fig. 12.

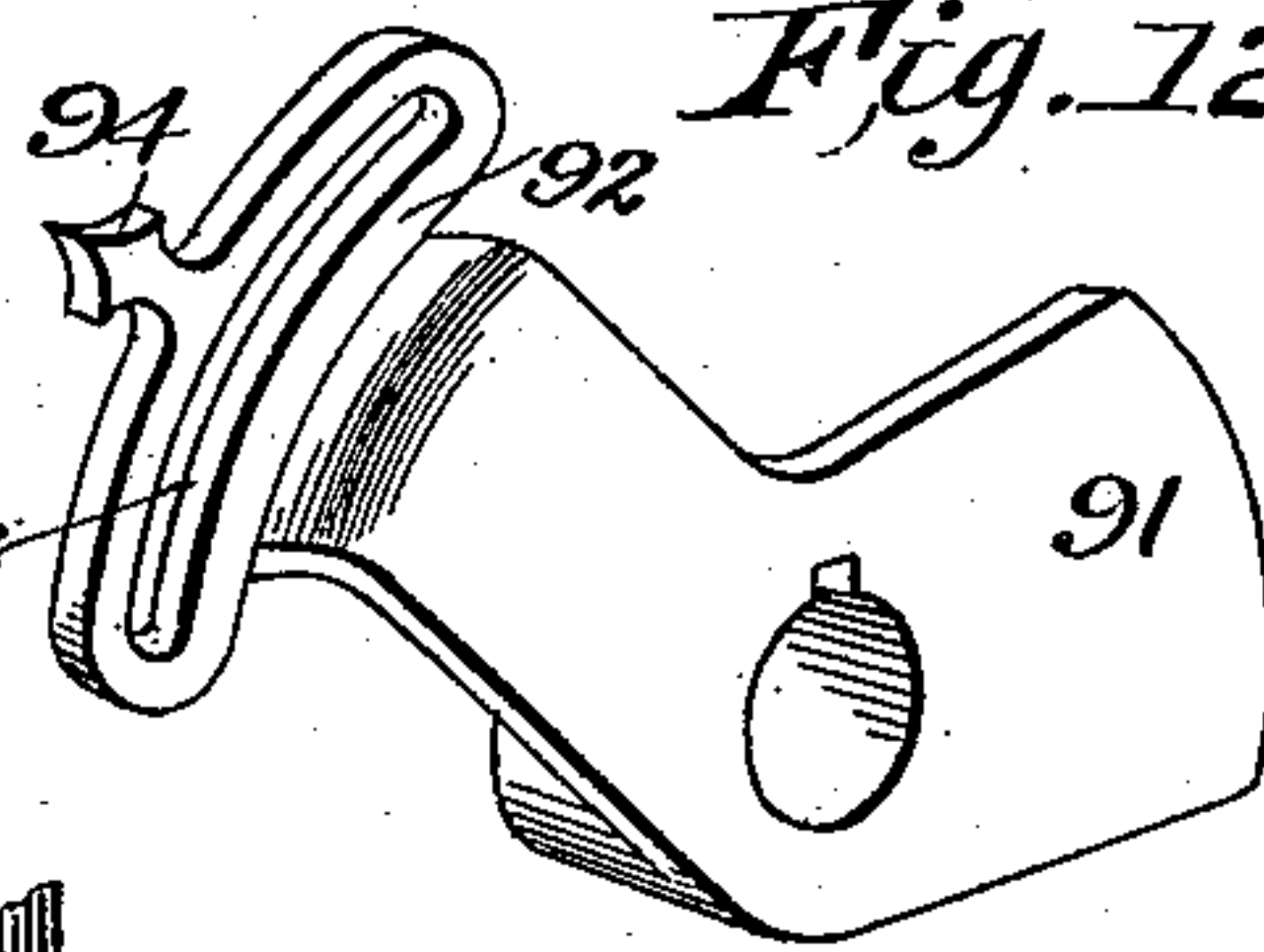


Fig. 11

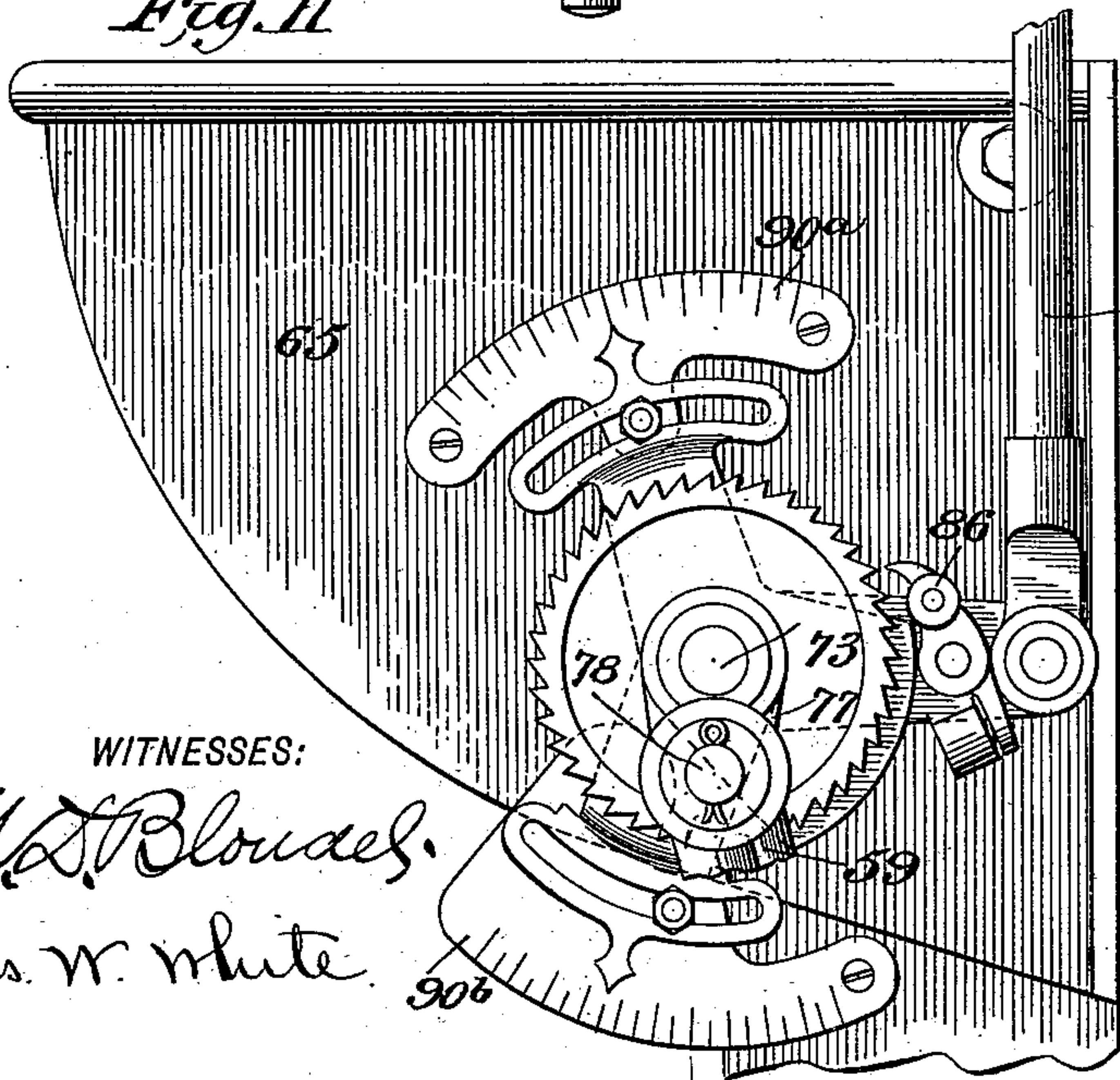
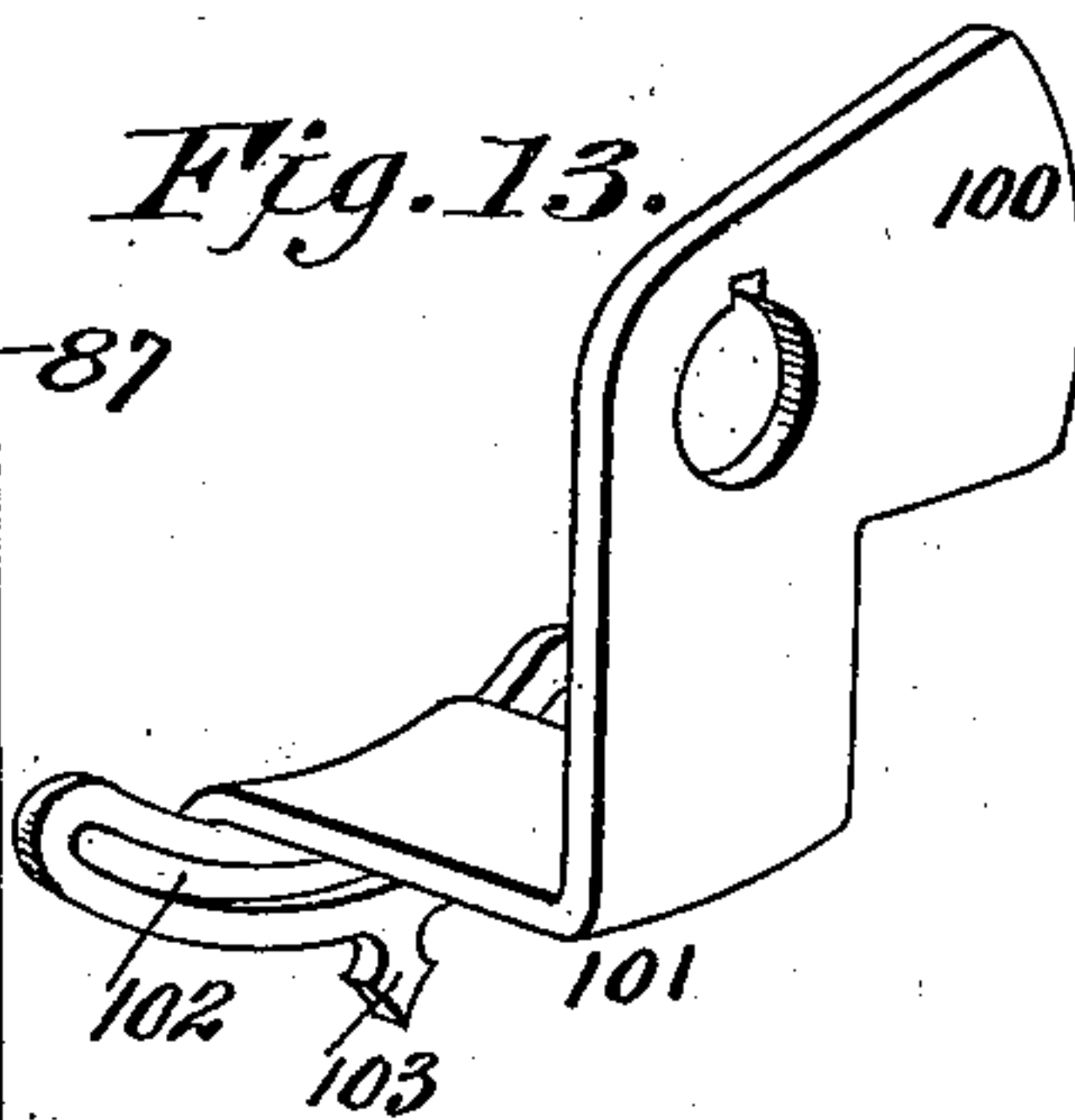


Fig. 13.



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UNITED STATES PATENT OFFICE.

ALFRED BOX, OF PHILADELPHIA, PENNSYLVANIA.

AUTOMATIC STOKER.

SPECIFICATION forming part of Letters Patent No. 549,868, dated November 12, 1895.

Application filed March 13, 1895. Serial No. 541,610. (No model.)

To all whom it may concern:

Be it known that I, ALFRED BOX, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Automatic Stokers; and I do hereby declare that the following specification, taken in connection with the accompanying drawings, is a full, clear, and exact description of my improvements, such as will enable those skilled in the art to make and use the same.

My invention consists, first, in providing independent adjustments for the coal-feed and for the shaking grate-bars; second, providing the grate-bars with roller-supports for rendering them more readily movable; third, means for rendering the ash-pit door air-tight when using an artificial draft, and fourth, improvements in the hollow water-back and side bars connected therewith.

My invention also consists of certain features of construction for carrying out the main points of my invention given above.

In order that my invention may be fully understood, I will first describe the same with reference to the accompanying drawings, and afterward particularly point out the novel features in the annexed claims.

In said drawings, Figure 1 is a detail longitudinal sectional view of a steam-boiler furnace, showing my improvements applied thereto. Fig. 2 is a detail plan view of the same. Fig. 3 is an enlarged detail front elevation of the right-hand side of the same. Fig. 4 is an enlarged detail sectional view similar to Fig. 1. Fig. 5 is a detail perspective view of the adjustable connecting-rods which connect the shaking grate-bars with the oscillating shaft. Fig. 6 is a sectional view taken on the line 6 6 of Fig. 4. Fig. 7 is a perspective view of one of the hollow side bars through which the water circulates. Figs. 8, 9, 10, 11, 12, and 13 are enlarged details views of the mechanism for independently adjusting the coal-feed and the movement of the shaking grate-bars.

Similar numerals of reference indicate the same parts throughout the several views.

The steam-boiler furnace shown in the drawings has a fire-wall 1 and main ash-pit 2, a front plate 3, to which are hinged the

ash-pit doors 4 and draft-doors 5, and the smaller or supplemental ash-pit 6 behind the hollow water-back 7.

8 is a horizontally-hinged door controlling the passage of ashes from the supplemental ash-pit 6 to the main ash-pit 2, in which latter a suitable ash-pan may be provided, if desired. The door 8 is operated through the rod 9, which passes through the sleeve 10, out through the front plate 3, the outer end of the rod being omitted.

The water-back 7 is suitably supported at its ends in the masonry and communicates with the water-chambers 15. (Shown by dotted lines.)

16 are the hollow inclined bars, supported at each side of the fire-box in the plane of the grate-bars and communicating with the water-back 7 through the chambers 15. The construction of these hollow side bars is clearly shown in Fig. 7. They may be supported by any suitable means in the fire-box, and suitable water connections may be made with a boiler to properly circulate the water through them, the water-back, and the boiler.

20 are the open grate-bars, preferably formed with steps, as shown, with the small openings 21 for the admission of air to support combustion. These grate-bars are substantially inverted-U shape in cross-section—that is, without any bottom portion—so as to allow the interior of the grate-bars to be in free communication with the ash-pit, from which the air to support the combustion is ordinarily supplied. The lower ends of the grate-bars 20 are formed with horizontal flanged tracks 22, (shown in Fig. 1,) and are supported upon anti-friction-rollers 23, which are journaled upon a rod 24, mounted in brackets 25, formed on the front face of the water-back 7. In the upper horizontal portion 26 of each of the grate-bars is journaled an anti-friction-roller 27, which projects just below the edge of the grate-bar and rests on the horizontal base-plate 28 of the draft-flue 29. The base-plates 28 are extended slightly inward to form guide-lugs 30 for confining the grate-bars. The flues 29 are normally closed by the doors 5.

It will be observed that the upper roller is inclosed by that portion of the grate-bar not used for fire-surface and is within the draft-flue, so there will be no danger of its becom-

ing clogged with ashes. The lower roller is also protected by being under the lower end of the grate-bar.

Each one of the ash-doors 4 is provided with means for clamping it tightly to its seat to render the ash-pit practically air-tight in order that an artificial draft can be supplied through the flues 29 into the open ends of the grate-bars. This means consists, preferably, of a shaft 35, journaled centrally in each door 4, and having keyed to its inner end a bar 36, and keyed to its outer end an operating-handle 37 and an intermediate screw-threaded portion 38, upon which operates an internally-threaded hand-wheel 39. When it is desired to securely clamp the door in closed position, the bar 36 is turned up into vertical position to engage with the front plate 3 by means of a handle 37 and held there while the hand-wheel 39 is revolved on the shaft 35, which will engage against the central boss 40 on the door and clamp the same tightly in place. To open the doors it is only necessary to loosen the hand-wheels 39 and turn the bars 36 out of engagement with the front plate 3, when it will be seen the door can be easily thrown open.

When the natural draft is depended upon the doors are permitted to be more or less open, the air passing up through the riser into the open grate-bar.

45 is a rock-shaft formed with a series of crank-arms to which are pivoted the upper sections 46 of the links which connect with the grate-bars for imparting a shaking motion to them. The lower sections 47 are journaled to the lugs 48, formed on the grate-bars 20, the inner contiguous faces 49 of said sections 46 and 47 being serrated or grooved, as shown, and adjustable clamp-bolts 50 being provided to engage in the longitudinal slots 51 for clamping the links in the desired adjusted position. By this means the connecting-links can be lengthened or shortened to suit.

55 is a crank-arm keyed to the oscillating rock-shaft 45 and projecting out through the opening 56 in the front plate 3. The crank-arm 55 is formed with a slotted outer end 57, in which is adjustably mounted a connecting-pin 58, having journaled to it a vertically-extending connecting-rod 59, which is operated for shaking the grates in a manner presently to be explained.

65 is the coal-hopper mounted upon the front plate 3 and having an opening 66 onto the grate-bars.

67 is a pivoted plate supported below the opening 66 and resting on the upper horizontal portions of the grate-bars for preventing the passage of air from the flue 29 above the grate-bars, and also to prevent any coal from passing into the flue from the fire.

Journaled in the hopper 65 is the pocketed feed-wheel 68, and supported above the feed-wheel 68 is a plate 69, which is pivoted at 70 and rests upon flanged supports 71. This plate is for the purpose of preventing the im-

proper feed of coal or air to the fire. The shaft 73 on the feed-wheel 68 is journaled in the ends of the hopper 65, one end of the same projecting beyond the hopper to be geared with the operating mechanism.

I will now proceed to describe the independently-adjustable mechanism for operating the coal-feed and the shaking grate-bars.

75 is a ratchet-wheel keyed to the shaft 73; 76 is another ratchet-wheel loosely journaled upon the shaft 73 and adapted to move independently thereof.

77 is a crank-arm formed integral with or connected to the ratchet-wheel 76, and 78 is a crank-pin mounted in the arm 77. The connecting-rod 59 is journaled to the crank-pin 78, so that the intermittent rotation of the ratchet-wheel 76 (by means soon to be described) will cause the rock-shaft 45 to oscillate slowly by intermittent steps for gradually and intermittently moving the grate-bars independently of each other.

80 is an arm journaled upon the shaft 73, between the ratchet-wheels 75 and 76, and 81 and 82 are pawls journaled upon each side of the arm 80 on the pin 83.

84 is a small cylindrical casting projecting from each side of the arm 80 directly under the pin 83, and 85 is a small spiral spring resting in the cavity in each one of the projections 84 and bearing on the heels of the pawls 81 and 82 for holding them normally in operative position.

86 are small rollers journaled on the forward ends of the pawls 81 and 82 for the purpose which will presently appear.

87 is a connecting-rod journaled to the arm 80 and adapted to be geared to any suitable operating mechanism which will impart an up-and-down movement to it for operating the pawl-and-ratchet mechanisms.

90 is a double dial secured to the end of the hopper 65 concentric to the shaft 73.

91 is a cam-track formed integral with a sleeve which is journaled upon the shaft 73 and with an arm 92, having a concentric slot 93 and an index 94, which is adapted to register with the upper part of the scale 90.

95 is a clamping-bolt which works in the concentric slot 93 and is adapted to hold the track 91 in any desired position, the position being indicated by the index 94 and dial.

It will be observed that the cam-track 91 projects up from the shaft 73 alongside of the ratchet-wheel 75, so as to come within the plane of the roller 86. It will also be observed that this cam-track 91 projects sufficiently far from the shaft 73 to hold the pawl 81 out of engagement with the ratchet-wheel 76. This is for the purpose of holding the pawl 81 out of working engagement with the ratchet-wheel 75 for a portion of its stroke, so that the amount of rotation of the feed-wheel 68 can be regulated.

100 is a cam-track similar to the cam-track 91, it being formed with a central sleeve by means of which it is journaled upon the shaft

73, and an integral right-angled extension or arm 101, which is formed with a concentric slot 102 and the index 103, which registers with the lower portion of the scale 90. 104 is a clamping-bolt working in the slot 102 and adapted to secure the arm 101 and its integral cam-track 100 to any desired position. The purpose of this cam-track is the same. It projects out from the shaft 73 alongside of the ratchet-wheel 76 and engages the friction-wheel 86 of the pawl 82 for holding it out of engagement with the ratchet-wheel 76 during a portion of its stroke. By shifting the cam-track 100, each intermittent stroke imparted to the ratchet-wheel 76 can be shortened or lengthened.

It will be observed that the cam-tracks 91 and 100 are readily adjusted by means of the arms 92 and 101, respectively, the clamping-bolt being first loosened.

In Fig. 11 the cam-tracks are shown in an adjusted position. In this figure the double dial 90 is done away with and two independent dials 90^a and 90^b are substituted.

The operation of my automatic mechanical stoker will be clear from the above.

Having thus fully described my invention, the following is what I claim as new therein and desire to secure by Letters Patent:

1. In a furnace, the combination of the water-back or support 7, the brackets 25 projecting from the support 7, the rollers 23 journaled in said brackets, the grate-bars 20 resting at their lower ends upon the rollers 23 and having the rollers 27 journaled in their upper ends, supports for the rollers at the upper ends of the grate-bars and means for reciprocating the grate-bars, substantially as set forth.

2. The combination, in a furnace, of the hollow grate-bars open on their under side, the ash pit, the draft flue, doors to the draft flue and ash pit, and means for clamping the ash pit door firmly to its seat consisting of a rod journaled in the door, and having a bar 36 and handle 37 keyed to its inner and outer ends respectively, and the hand wheel 39 working on a threaded portion of said rod, substantially as and for the purpose set forth.

3. The combination of the grate-bars 20, the oscillating shaft 45, means for operating said shaft, and rods connecting the shaft with the grate-bars; each of said connecting rods being formed of two sections having grooved or serrated faces and provided with a clamping bolt for securing the sections together to form a rod of the desired length, as set forth.

4. The combination of the grate-bars, the oscillating shaft 45, connected with said grate-bars, a crank arm extending from said shaft, a ratchet wheel provided with a crank pin, a connecting rod connecting the crank pin with the crank arm of the oscillating shaft, and means for intermittently operating the ratchet wheel, substantially as set forth.

5. The combination of a coal chute of a furnace, a feed wheel journaled in said coal chute and adapted to regulate the supply of coal to the furnace, a ratchet wheel keyed to said shaft for operating the feed wheel, a second ratchet-wheel loosely mounted upon said shaft, a series of reciprocating grate-bars, means for communicating motion from said second ratchet-wheel to said grate-bars, an oscillating arm journaled upon said shaft between said ratchet wheels, two pivoted pawls journaled upon opposite sides of said oscillating arm and supported thereby in proper position to operate the two ratchet-wheels, means for imparting motion to said oscillating arm, and independently adjustable cam tracks supported concentrically to said shaft and adapted to hold said pawls out of engagement with the ratchet-wheels for portions of their strokes, substantially as and for the purposes set forth.

6. The combination of a coal chute, a feed wheel journaled therein, a series of reciprocating grate-bars, a ratchet wheel keyed to the shaft of the feed wheel and adapted to operate it, a second ratchet-wheel loosely mounted upon the shaft of the feed wheel, means for imparting motion from the second ratchet-wheel to the reciprocating grate-bars, an oscillating arm journaled upon the shaft between the ratchet-wheels and carrying a pair of operating pawls which are adapted to engage with said ratchet-wheels, means for imparting motion to the oscillating arm, independent cam tracks journaled upon the shaft and extending concentrically thereto and adapted to hold the pawls out of engagement with their ratchet-wheels for portions of their strokes, operating arms extending from the cam tracks, an index on each operating arm, means for clamping the operating arms in any desired position, and scales with which the indexes on the operating arms register, substantially as and for the purposes set forth.

ALFRED BOX.

Witnesses:

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