

No. 652,357.

Patented June 26, 1900.

J. H. GREENSTREET.  
BOX MAKING MACHINE.

(Application filed Apr. 24, 1899.)

(No Model.)

6 Sheets—Sheet 1.

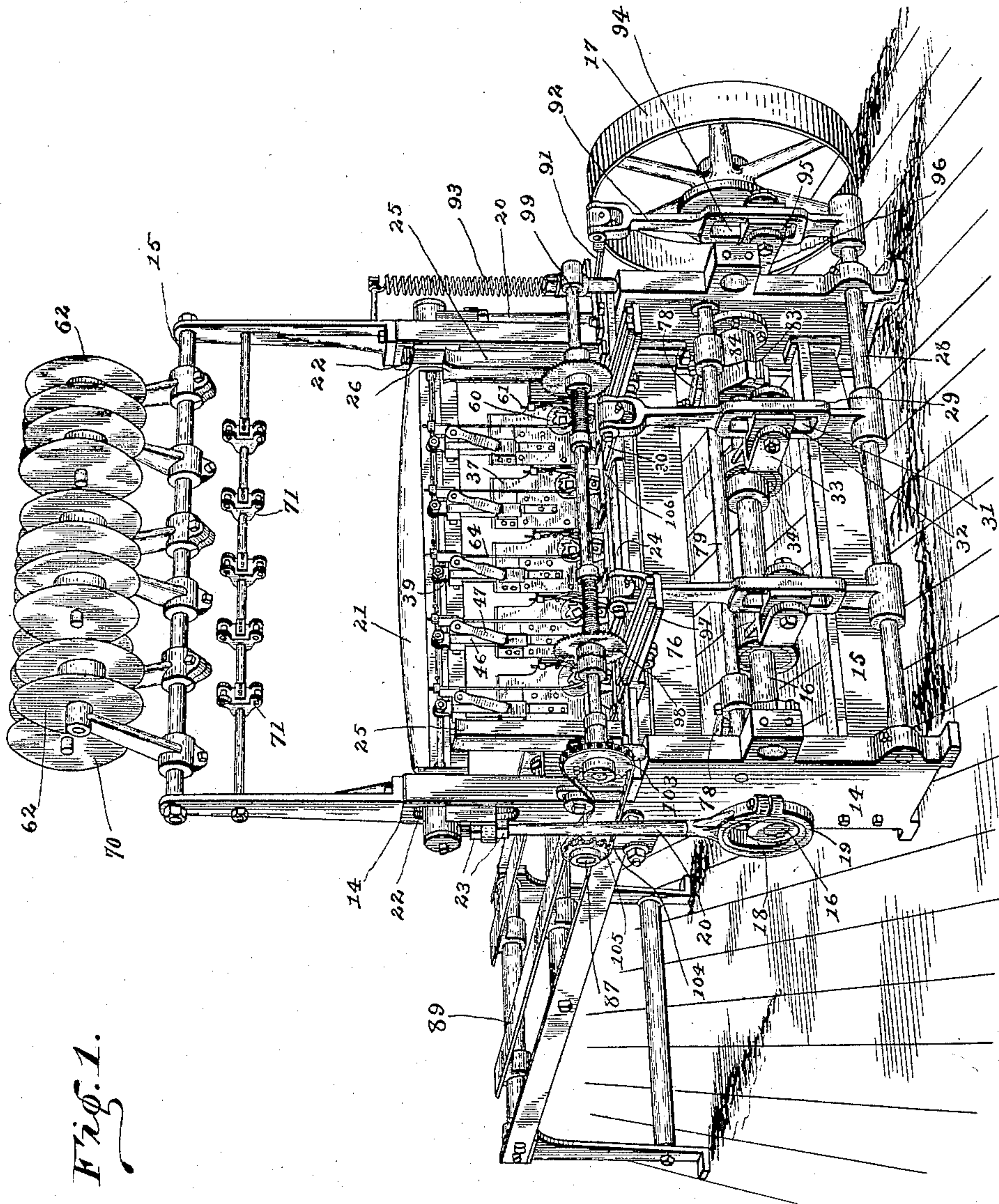


Fig. 1.

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Chester Bradford,  
ATTORNEY.

**No. 652,357.**

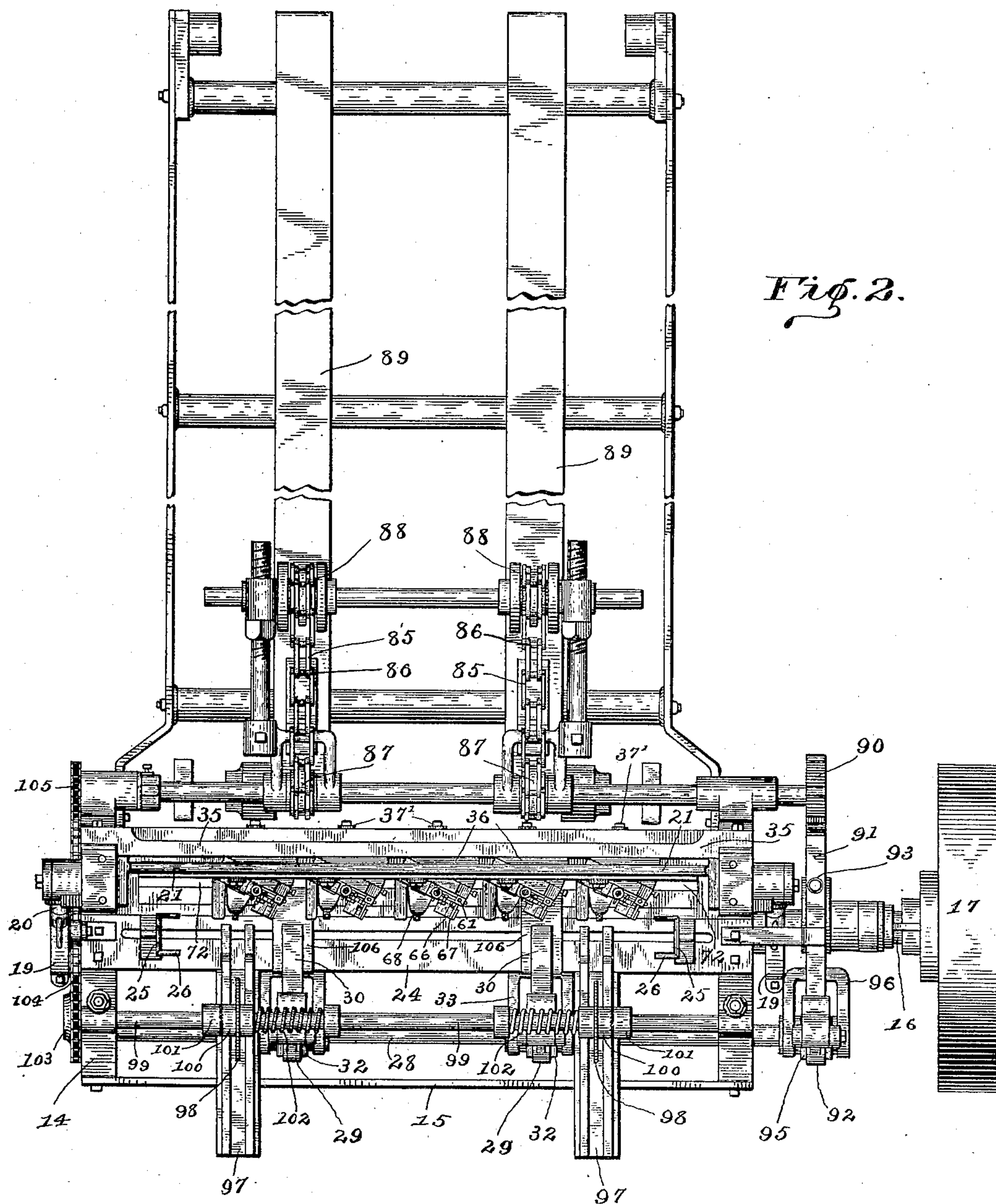
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**6 Sheets—Sheet 2.**



WITNESSES :

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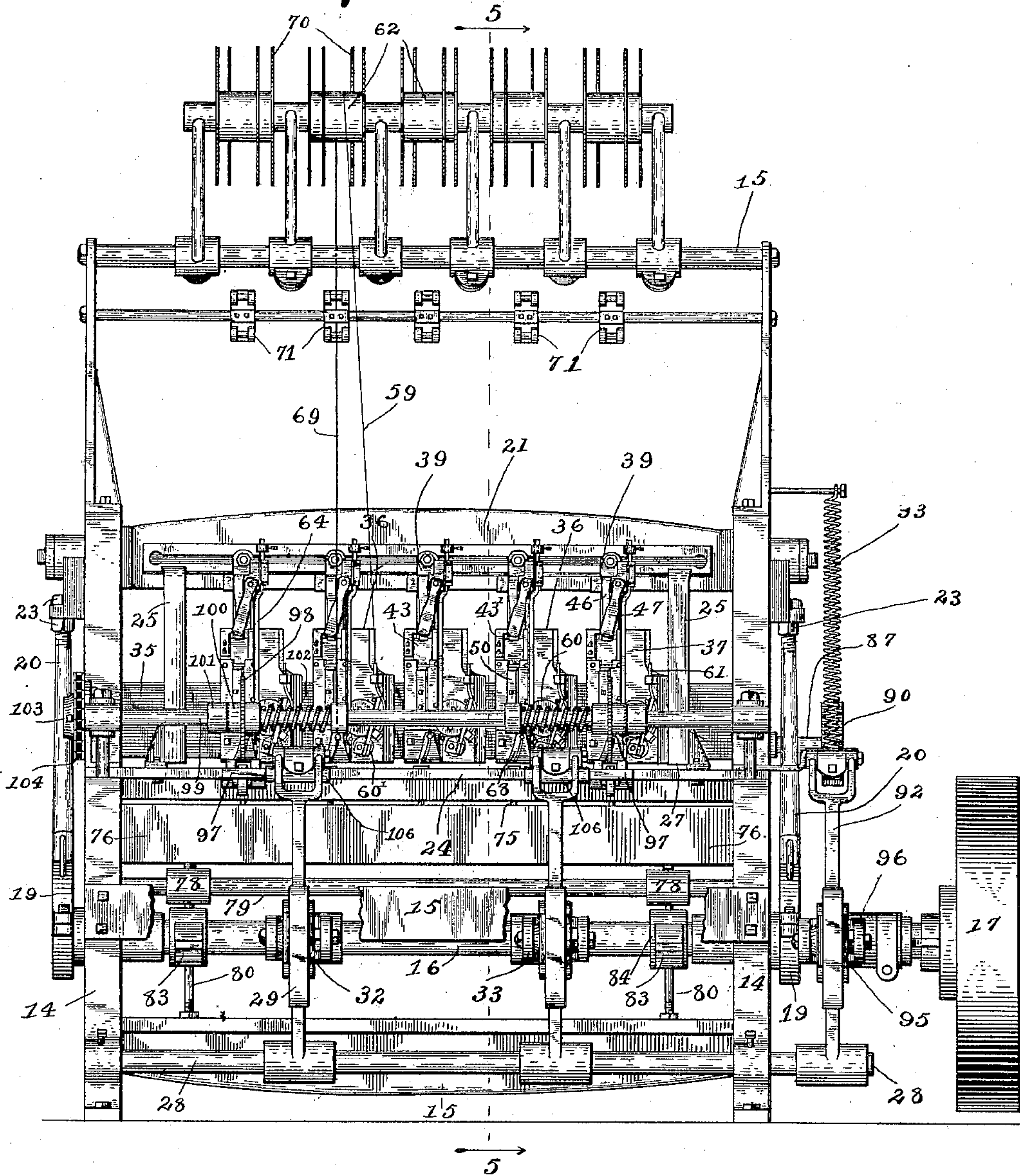
J. H. GREENSTREET.  
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(No Model.)

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Fig. 3.



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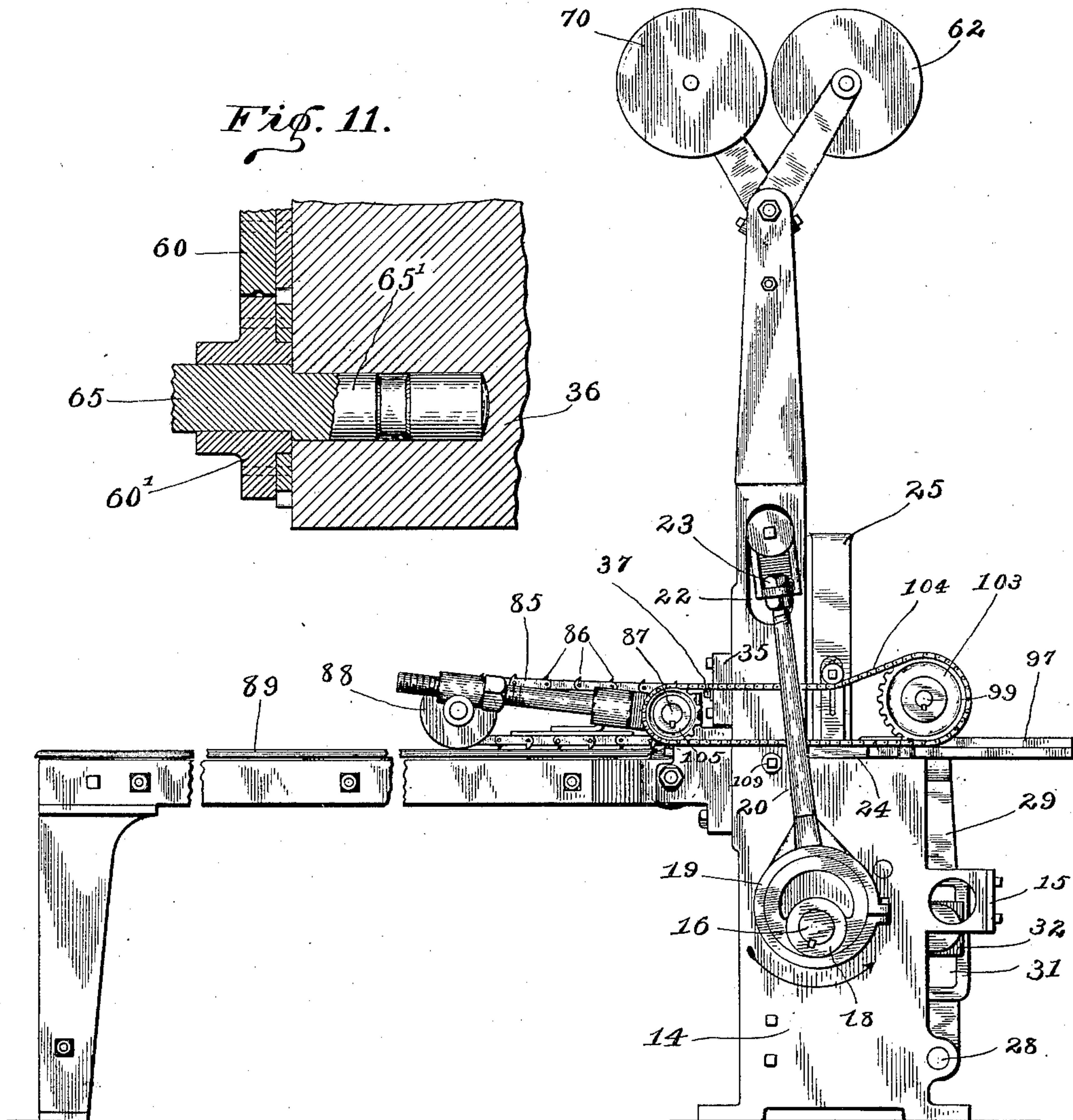
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Fig. 4.



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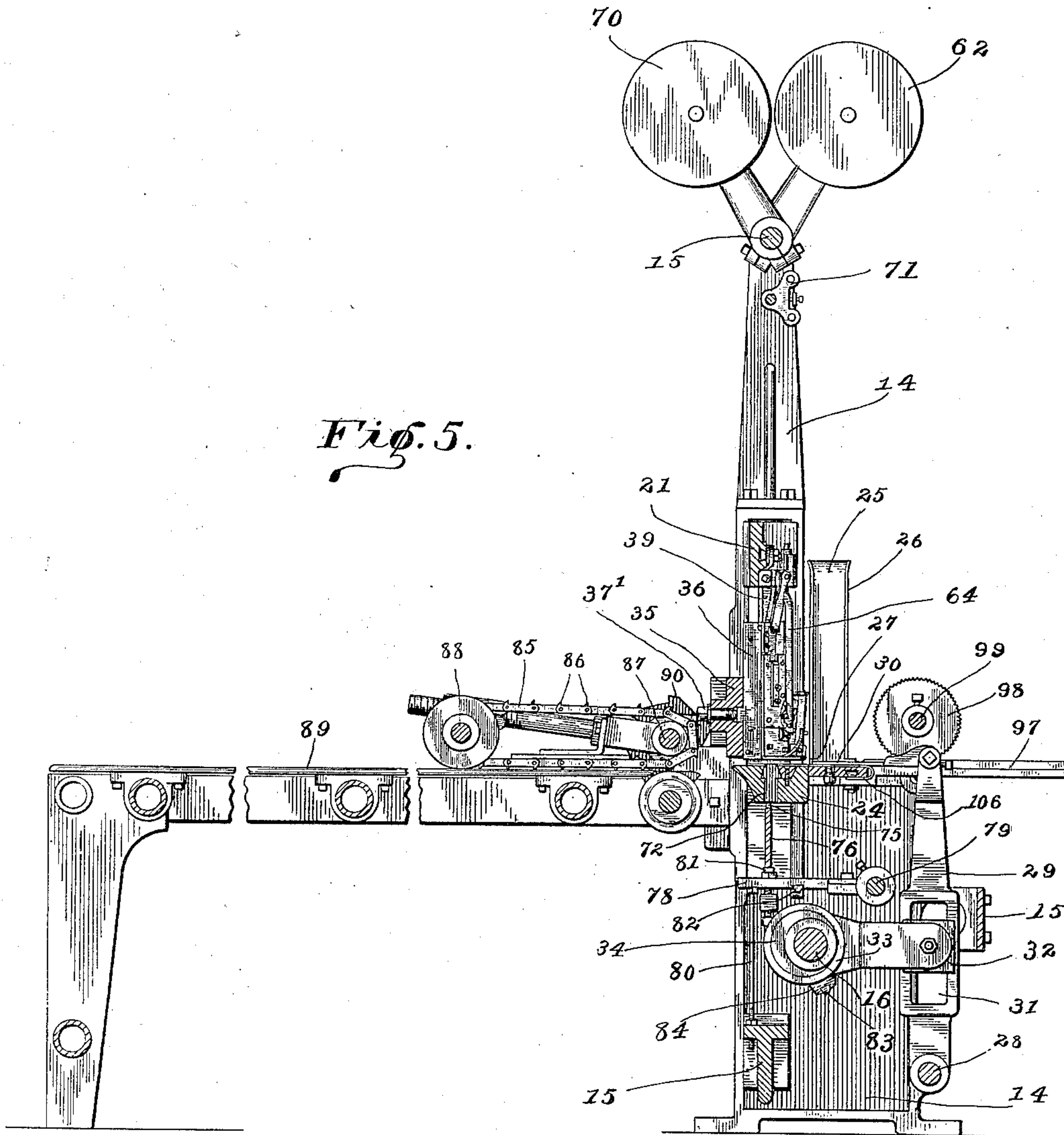
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6 Sheets—Sheet 5.



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(No Model.)

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Fig. 6.

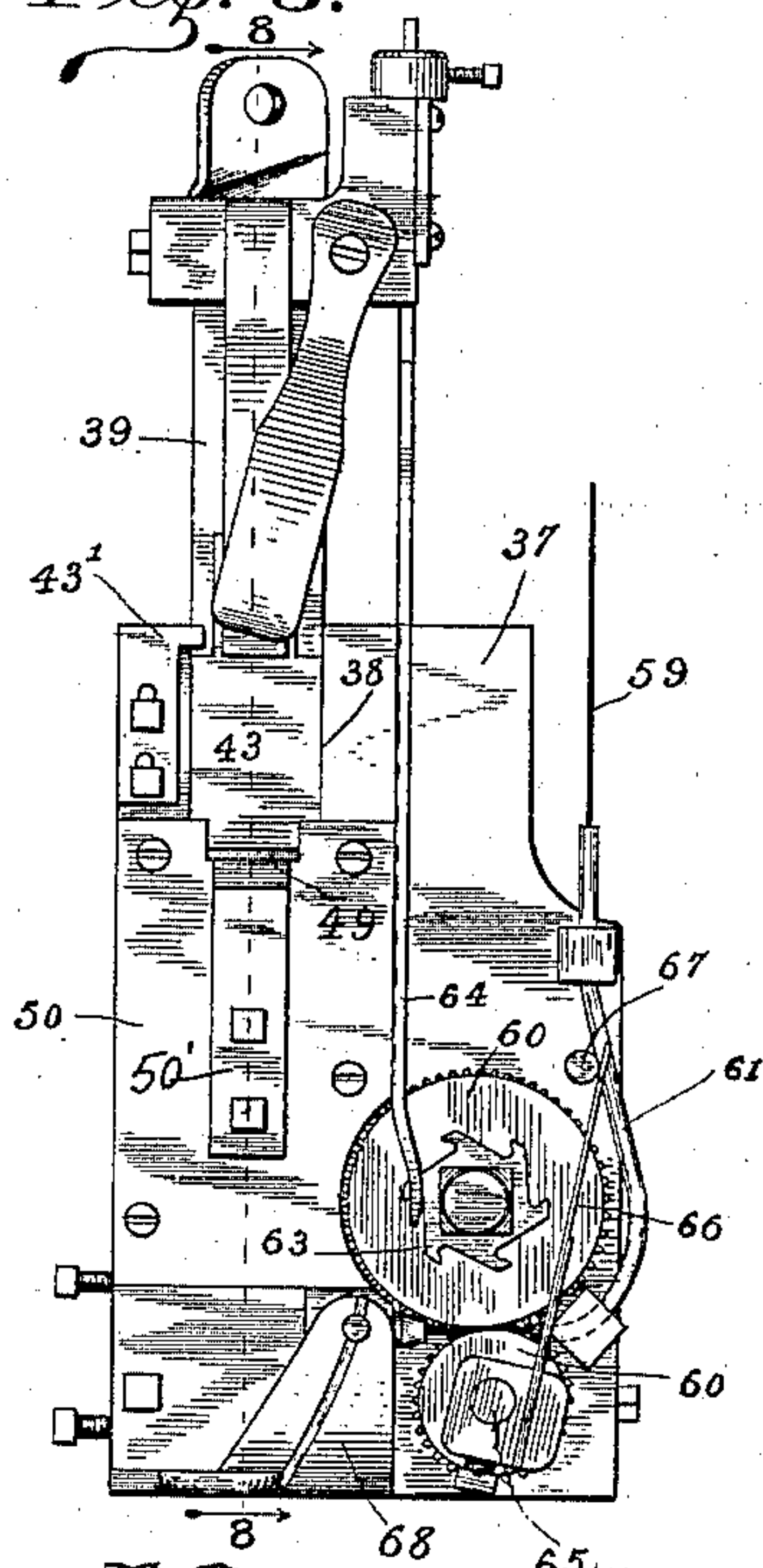


Fig. 8.

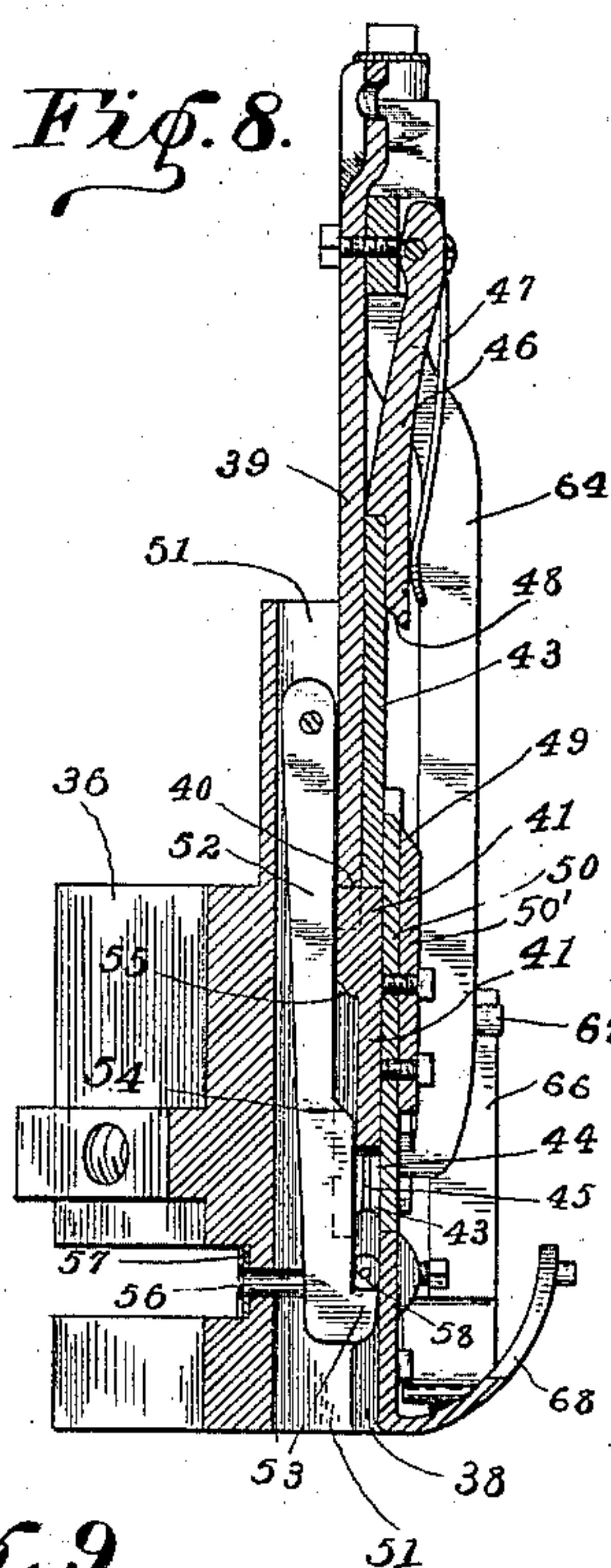


Fig. 7.

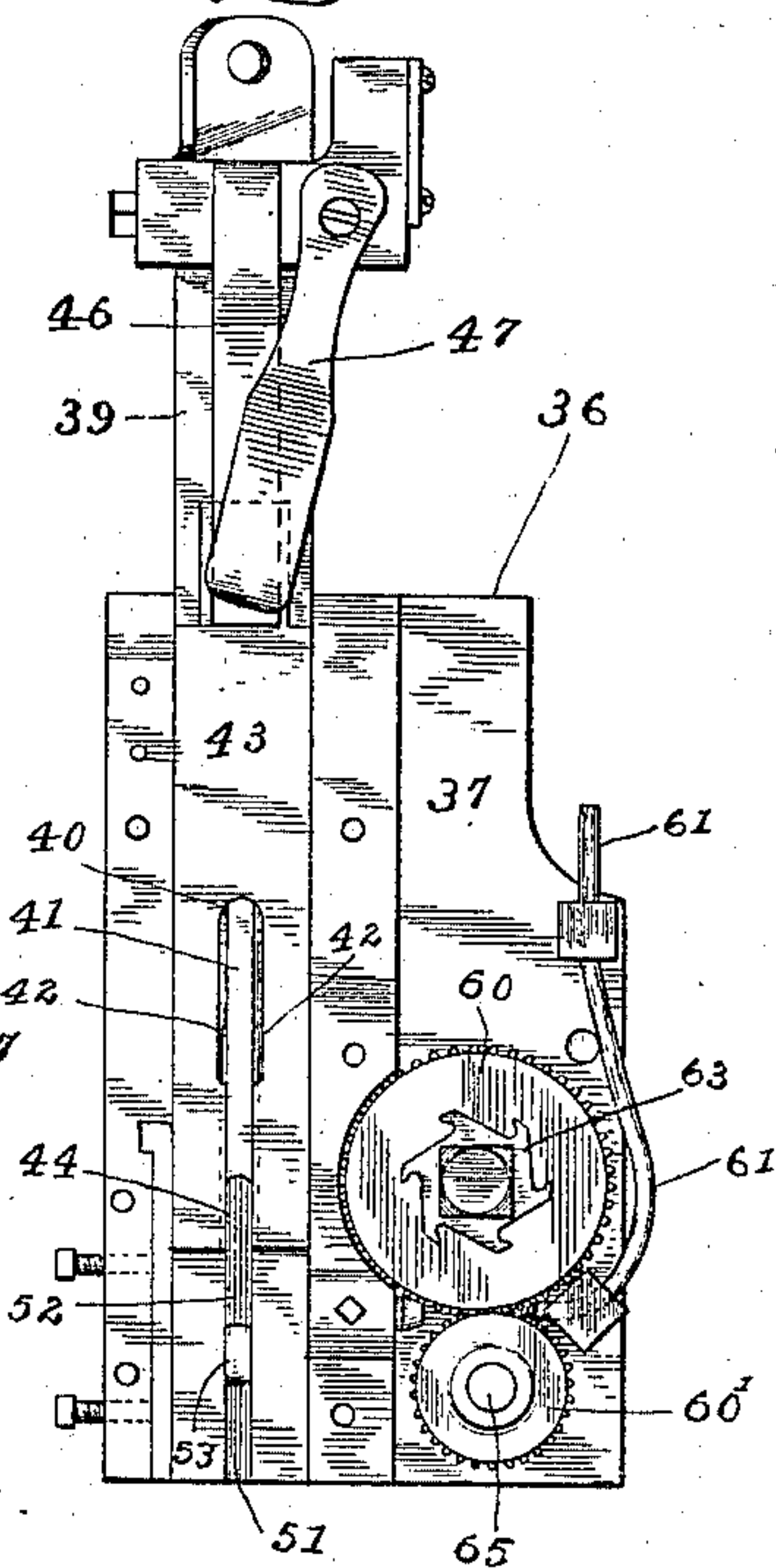


Fig. 9.

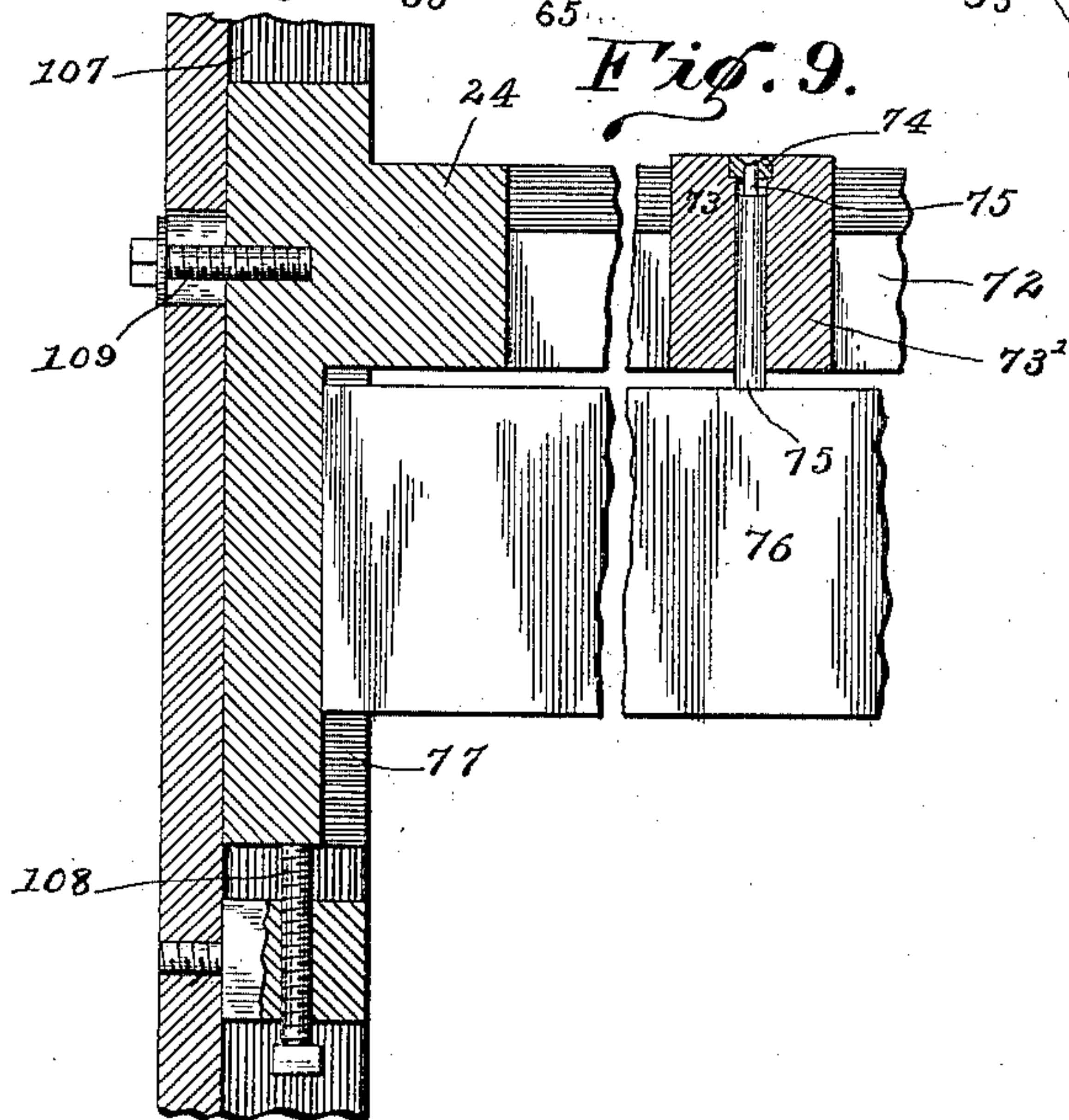
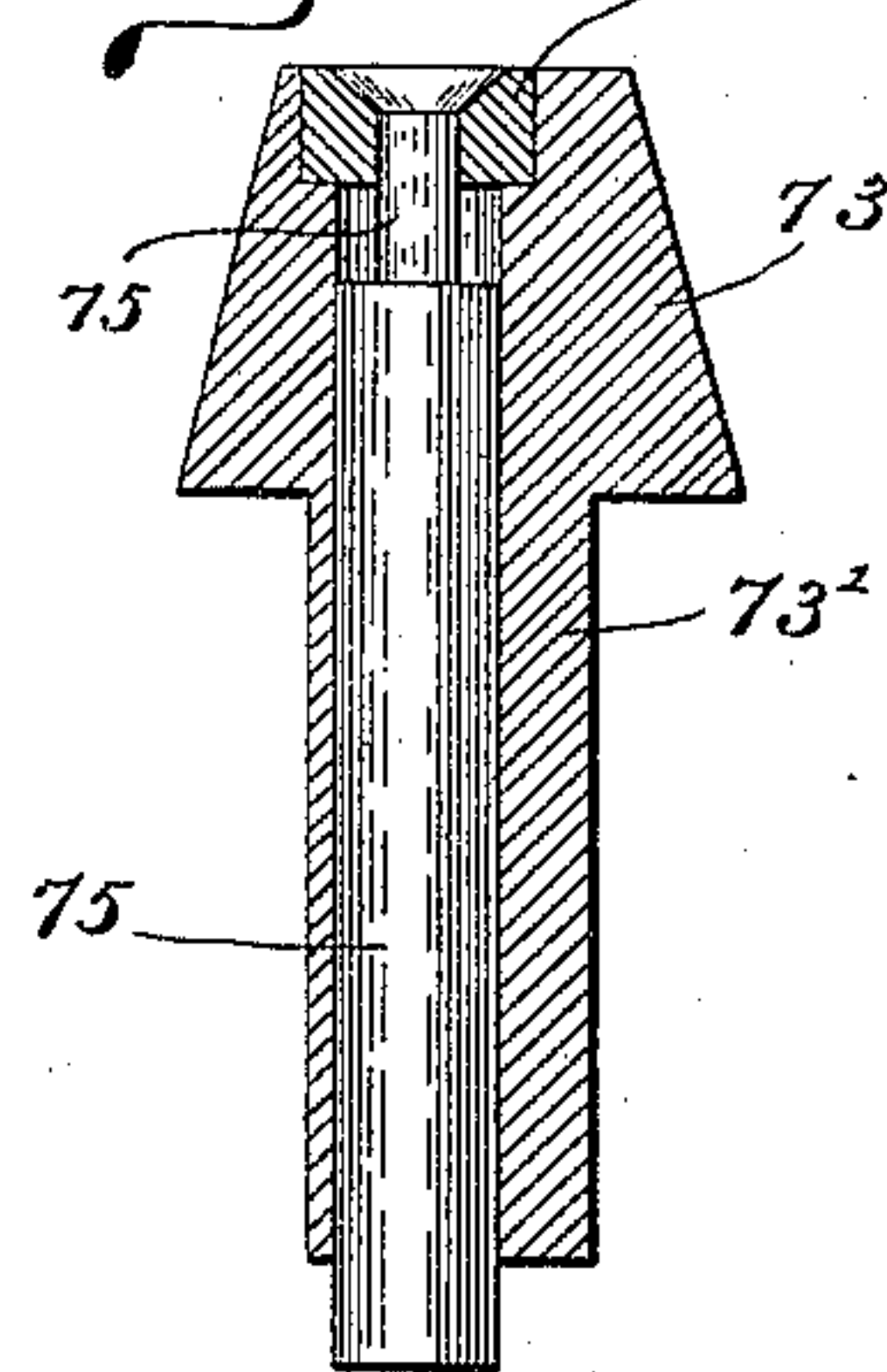


Fig. 10.



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# UNITED STATES PATENT OFFICE.

JASON H. GREENSTREET, OF INDIANAPOLIS, INDIANA.

## BOX-MAKING MACHINE.

SPECIFICATION forming part of Letters Patent No. 652,357, dated June 26, 1900.

Application filed April 24, 1899. Serial No. 714,302. (No model.)

*To all whom it may concern:*

Be it known that I, JASON H. GREENSTREET, a citizen of the United States, residing at Indianapolis, in the county of Marion and State of Indiana, have invented certain new and useful Improvements in Box-Making Machines, of which the following is a specification.

My invention relates to an improvement in stapling-machines. Its object is to produce a machine capable of forming slatted box-stock, the operation of which machine shall be more efficient than that of the somewhat similar machine shown in Letters Patent No. 579,574, issued to me March 30, 1897. To this end I have provided an improved staple forming and driving mechanism, improved means for feeding the staple-wire, improved means for feeding the slats into the machine, improved means for accurately spacing the slats and for properly withdrawing the product from the machine, improved means for clenching the staples, means for feeding into the machine longitudinal or under cleats at right angles to the main slats, means for feeding said longitudinal cleats, means for varying the spaces between the main slats, and such improvements in details of construction as may be hereinafter described.

Referring to the accompanying drawings, which are made a part hereof, and on which similar reference characters indicate similar parts, Figure 1 is a perspective view of the entire machine; Fig. 2, a top or plan view, some parts of the table being broken away to enable the drawing to be made on a larger scale; Fig. 3, a front elevation; Fig. 4, a side elevation; Fig. 5, a longitudinal vertical section as seen from the dotted line 5 5 in Fig. 3; Fig. 6, an enlarged front elevation of the staple former and driver; Fig. 7, a similar view with the face-plate removed; Fig. 8, a vertical section on the dotted line 8 8 in Fig. 6. Fig. 9 is a transverse vertical sectional detail of one of the clenching-anvils and the setting therefor; Fig. 10, a sectional detail of one of the clenching anvils and hammer, and Fig. 11 a detail of the staple-wire-feeding rolls.

In the drawings the portions marked 14 14 represent the sides of a supporting-frame, which sides are connected by appropriate

cross-bars 15. Mounted in suitable bearings in the lower portions of said sides 14 14 is a transversely-arranged drive-shaft 16, provided with a pulley 17. Secured to the shaft 16, one near each end, outside of sides 14, are two eccentrics 18, each surrounded by the usual strap 19, to which is attached a pitman 20. The upper ends of the pitmen 20 are secured to the projecting ends of a reciprocating head 21, which extends between the sides 14 and the ends of which project through vertical slots 22, formed through said sides. The head 21 is vertically adjustable on the pitmen by means of nuts 23.

Extending between the sides 14 and beneath the head 21 is a feed-table 24, to which is secured in front of the head 21 a pair of slat-chutes 25, said chutes being placed one at each end of the table in position to receive the ends of a series of slats piled one on top of another. The chutes 25 are adjustable toward and from each other to accommodate slats of different lengths. The forward flanges 26 of the chutes 25 are cut away at their lower ends for a distance slightly greater than the thickness of a slat, as shown at 27.

For the purpose of feeding the slats in succession to the machine I mount in the sides 14, near their lower ends, a rod 28, upon which is pivoted a pair of levers 29, to the upper end of each of which is pivoted a finger 30, the free end of which rests upon the feed-table 24, one near each slat-chute. In order that the throw of fingers 30 may be adjusted, each lever 29 is slotted at 31, and in said slot is adjustably mounted a cross-head 32. Pivoted to each cross-head 32 is the end of an eccentric-strap 33, each operated by a suitable eccentric 34, secured to the drive-shaft 16.

Secured to the sides 14, between the head 21 and feed-table 24, is a bar 35, to which is secured a series of stapling-heads 36, the bar being slotted and each head being longitudinally adjustable along the bar by means of a bolt 37, passing through the slot and into the head. Each head 36 is wedge-shaped in cross-section, so that its face 37 lies at an angle to the median line of the machine. The faces 37 of the heads 36 are each provided with a vertical channel 38, the bottom of which lies parallel with face 37 and in which



is mounted a reciprocating hammer-bar 39, the upper end thereof being adjustably secured to the head 21. The bar 39 is provided at its lower end with a mortise 40, into which  
 5 is removably fitted and fixed the upper end of a hammer-head 41, which is somewhat thicker than the bar 39 and projects from the face of said bar. The projecting portion of said head 41 is provided on each side with a  
 10 longitudinal tongue 42. Slidably mounted upon the face of bar 39 is a follower or staple-former 43, which also lies within and fits the channel 38. The former 43 is shorter than the bar 39 and is provided at its lower  
 15 end with a longitudinal slot 44, adapted to receive the projecting portion of the hammer-head 41, the sides of said slot being each provided with a groove 45, adapted to receive the corresponding tongue 42. The upper end  
 20 of the former 43 is normally engaged and held in its outer position on the bar 39 by a dog 46, one end of which is pivoted to said bar 39 and the free end of which is held in position by means of a spring 47. The upward return  
 25 movement of the former 43 is limited by a suitable stop 43'. The free end of the dog 46 projects over the end of the former 43, and the projecting end is beveled, as at 48, so as to engage and be thrown out by the upper  
 30 beveled end 49 of a face-plate 50, which is secured to the face 37 in position to retain the several parts within the channel 38. The bevel 49 is prolonged by the upper end of a piece 50', which may be bolted or otherwise  
 35 secured to the plate 50. Formed in the bottom of the channel 38 is a narrow channel 51, within which is pivoted a finger 52, the free end thereof carrying a projecting lug or swage 53, which projects into and fits a slot 44 be-  
 40 neath the lower end of the hammer-head 41. In order to withdraw swage 53 after the staple has been formed, the finger 52 is provided with a beveled shoulder 54, adapted to be engaged by an oppositely-beveled shoulder  
 45 55, formed upon the back of the hammer-head 41. The finger 52 is normally held out by means of a pin 56, which in turn is yieldingly forced inward by a flat spring 57.

Mounted in the face 37 of the head 36 and  
 50 leading into the channel 38, immediately above the swage 53, is a hardened bushing 58, through which the staple-wire 59 is passed. For the purpose of feeding the wire 59 through the bushing 58 and into the staple-former, I  
 55 provide a pair of feed-rolls 60 and 60', which are geared together, the operating peripheries thereof being preferably on the pitch-lines of the gears. The rolls 60 and 60' are placed so  
 60 as to direct the staple-wire into the bushing 58, and leading into the mouth of said rolls is a tubular wire-guide 61, through which the staple-wire is passed from its bobbin 62. To  
 intermittently rotate the rolls 60 and 60', said  
 65 roll 60 is provided with a ratchet 63, which is engaged by a finger 64, adjustably secured to the reciprocating hammer-bar 39. In order to prevent a backward movement of the

roll 60 and of the staple-wire, the shaft 65 of roll 60' is provided at its inner end with an  
 eccentric portion 65', which is rotatably  
 70 mounted in the head 36. Shaft 65 is yieldingly held against a counter clockwise movement by means of a flat spring 66, one end of which is secured to said shaft 65, while the  
 75 free end thereof engages a stop 67. The eccentric of shaft 65 is so set that when the shaft is moved against the action of the spring 66 the roll 60' will move away from roll 60. If the shaft 65 is moved in the opposite direc-  
 80 tion, however, its movement is unimpeded, the spring 66 leaving the stop 67 and roll 60' is brought closer to roll 60, thus pinching the staple-wire and preventing a backward movement of said wire or of roll 60.

Secured to the face 37 of the head 36, at its  
 85 lower end, is a suitable guide-plate 68, adapted to receive and guide the slat-wire 69 beneath the lower end of channel 38. The slat-wires 69 are carried by suitable bobbins 70 and are passed through tension-yokes 71. 90

Immediately beneath channels 38 of the  
 staple-former the feed-table 24 is provided with a transverse slot 72, the upper end of which is dovetailed, so as to receive the heads  
 95 73 of a series of anvils 73', one of which is mounted beneath each staple-former. Each anvil is provided with a concave clenching-socket 74, the bottom of which is formed by a reciprocating clenching-hammer 75. The  
 lower ends of hammers 75 rest upon a recip- 100  
 105 rocating cross-bar 76, mounted in ways 77 in table 24. The cross-bar 76 is supported by a pair of arms 78 78, carried by a rock-shaft 79, which shaft is mounted in the sides 14. Arms 78 normally rest upon the upper ends  
 110 of supports 80, and suitable adjusting-screws 81 are placed between said arms and the cross-bar 76. Said arms 78 are provided on their lower faces with steel lugs 82, which are intermittently engaged by similar lugs 83,  
 115 which form the working faces of cams 84, carried by the drive-shaft 16.

It is important that the finished product be accurately carried away from the staple-  
 120 drivers, so that the slats will be uniformly spaced therein. For this purpose, therefore, I provide a pair of carrier-chains 85 85, the links of which are provided with sharp teeth 86, adapted to sink into the slats. Said chains 85 pass over a driving-shaft 87 and an idler 120  
 88, suitably mounted above a receiving-table 89, which extends to the rear from sides 14. In order to intermittently advance the carrier-chains 85, the shaft 87 is provided at one  
 125 end with a ratchet 90, the teeth of which are engaged by the free end of a finger 91. Finger 91 is pivoted to the upper end of a lever 92, pivoted upon rod 28, and is held in engagement with ratchet 90 by means of a  
 130 spring 93. The lever 92 is provided with a longitudinal slot 94, in which is adjustably mounted a cross-head 95, to which is pivoted the end of an eccentric-strap 96, said strap being operated by means of an eccentric car-



ried by drive-shaft 16. By means of the adjustable cross-head 95 the throw of the lever 92, and the consequent movement of the carrier-chains, may be adjusted and the space 5 between the slats varied, differently spaced ratchets being substituted for the ratchet 90.

In slatted box-stock it is often desirable to supplement the slat-wires by longitudinal cleats or runners. In order, therefore, that 10 such cleats may be attached to the slats by the same staples with which the slat-wires are attached and at the same time, I secure to the forward end of feed-table 24 one or more cleat-guides 97, each so arranged as to 15 direct its cleat beneath one of the staple-drivers. Above each cleat-guide, in position to engage the cleat, I mount a serrated feed-wheel 98. Each feed-wheel 98 is loosely mounted on a shaft 99 and is provided with 20 a clutch member 100, adapted to be engaged by a similar clutch member 101, carried by the shaft. The two clutch members are normally held in engagement by means of a spring 102, and their arrangement is such as 25 to allow such rotation of the feed-roll as to permit the introduction of a cleat without moving the other portions of the machine. Shaft 99 is provided at one end with a sprocket-wheel 103, receiving a chain 104, 30 which is also passed over a sprocket-wheel 105, carried by shaft 87, the cleats being thus advanced with the same speed and at the times as the receiving-chains and slats engaged thereby.

In order to allow for the thickness of the cleats, risers 106 are placed on table 24 in position to receive the slats. The anvils 73, other than those lying beneath the cleats, are then allowed to project above the feed-table 40 24 a distance equal to the thickness of the risers, so as to properly support the slats. In order to accommodate slats of different thicknesses, the feed-table is vertically adjustable in ways 107 of sides 14 by means of adjusting-screws 108. Clamping-bolts 109 are provided to hold the table in any adjusted position. 45

The operation of the machine is as follows: Each of the bobbins 62 is provided with staple-wire. Each bobbin 70 is provided with 50 slat-wire. Longitudinal cleats are passed under rolls 98 and beneath the corresponding staple-drivers and a series of slats placed in the slat-chutes 25, the bottom slat lying on top of the cleats and also on top of the fingers 30, when the parts are in the position shown in the drawings. Each staple-wire is then threaded through its guide-tube 61, between rolls 60 and 60', through bushing 58, into 60 and across channel 38, beneath follower 43, and on top of swage 53. Each slat-wire is then threaded through the tension-yoke 71, passed through the guides of the plate 68, and along beneath the hammer 41 of the corresponding head 36. With the several parts in 65 these positions and in the positions shown in the drawings the machine is ready for opera-

tion, the drive-shaft to be turned in the direction indicated by the arrow. As the shaft 16 rotates the cams 34 will cause the lever 29 70 to withdraw the finger 30 until a slat drops in front thereof. A further rotation of the shaft throws the fingers 30 forward again and forces the slat forward beneath the staple-drivers. At the same time the movement of 75 the strap 96 and its eccentric has caused the shaft 87, shaft 99, and feed-rolls 98 to force the cleats forward the desired distance. A continued movement of the shaft 16 causes the cams 18 to bring the head 21 down. The 80 movement of the head 21 forces the hammer-bars 39 down, said bars carrying with them for a time the followers 43. The first movement of the follower 43 brings the lower end thereof into engagement with the wire 59, and 85 this, in coöperation with bushing 58, cuts off a length of staple-wire equal to the width of channel 38. A continued movement of the follower doubles the severed portion of staple-wire over the swage 53, the ends of said wire 90 lying in the grooves 45. Just before the lower end of the hammer 41 reaches the swage 53 the shoulder 55 of said hammer is brought into engagement with shoulder 54 of the finger 52 and the swage is withdrawn. At prac- 95 tically the same time the lower end of the follower has reached the slat, the two portions thereof straddling the slat-wire 69, the beveled end 48 of the dog 46 is brought into engagement with the beveled end 49 of the face- 100 plate 50 and the dog thrown out of engagement with the follower, thus leaving the hammer-head free to advance, its lower end being in engagement with the head or doubled portion of the staple, and this forces said 105 staple into the slat astride the slat-wire, the legs of said staple being supported during the operation by the walls of slot 44. As the ends of the staple pass through the slat they are forced toward each other by the clenching- 110 socket 74. When the head of the staple has been pressed home by the hammer-head and before said hammer-head has left the staple, the lugs 83 and cams 84 are brought sharply 115 into engagement with the lugs 82 of the arms 78, which arms thus force the bar 76 upward, the several clenching-hammers 75 coming sharply into engagement with the staple ends and clenching them firmly in position. While this is being done, the fingers 30 have again 120 been caused to recede and a new slat has dropped down in front thereof. A continued rotation of the shaft causes fingers 30 to advance another slat beneath the staple-drivers. At the same time the hammer-bars 125 39 are drawn upward by the upward movement of the head 21. As the bars 39 move upward the followers 43 move therewith until the upper end of each is brought into engagement with its stop 43'. The bars 39 con- 130 tinue their upward movement, however, until a dog 46 may be forced by springs 41 back into engagement with the upper ends of the followers. The upward movement of the bars



39 allows each swage 53 to be moved back into normal position by means of the springs 57 and pins 56. At the same time the finger 64 has advanced the rolls 60 and 60', the staple-wire 59 being positively fed forward thereby until its end extends across the channel 38 beneath the follower and on top of the swage. When the slats come from beneath the staple-drivers, they are positively engaged by the teeth 86 of the chains 85, and as the machine continues to advance there are at all times several slats engaged by said teeth, so that said slats and the slat-wires attached thereto are positively withdrawn from the machine, insuring an accurate spacing of the slats. The operation of the staple-drivers over the longitudinal cleats is the same as the others, the staples, however, being clenched into the cleats instead of into the slats.

By means of the adjustable cross-heads in the levers 29 slats of different widths may be used by varying the throw of the fingers 30, and the spaces between the slats may be varied by substituting a different ratchet 90 and changing the throw of the lever 92 and the consequent movement of the finger 91.

The staple forming and driving mechanism lies at an angle to the direction of motion of the slats, so that the staples while straddling the slat-wires lie close to said wires and as far as possible from the edges of the slats, thus preventing as far as possible any splitting of the slats.

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

1. In a stapling-machine, a staple-wire feeder consisting of a pair of feed-rolls geared together, an eccentrically-mounted shaft for one of said rolls, and a spring for yieldingly holding said shaft in position, for the purpose described.

2. In a stapling-machine, a staple-wire feeder consisting of a pair of feed-rolls geared together, an eccentrically-mounted shaft for one of said rolls, a spring secured at one end to said shaft and engaging a stop, the arrangement being such that the movement of said shaft about its axis is practically unresisted in one direction and yieldingly resisted in the other direction.

3. In a stapling-machine, the combination with a feed-table and staple-driving means, of means for feeding a series of slats in succession beneath the staple-drivers, and means for feeding beneath one or more of said staple-drivers a cleat lying at an angle to the slats, consisting of a shaft, a serrated feed-wheel thereon, and a clutch whereby said wheel is driven from said shaft while being permitted practically free rotation thereon in one direction, the arrangement being such that the staples will pass through the slats and cleats.

4. In a stapling-machine for attaching one or more continuous wires to a series of slats, the combination with the feed-table, of one

or more staple forming and driving means, a slat-guide leading to the feed-table, a pair of reciprocating fingers arranged to feed the slats in succession to the stapling means, means for reciprocating said fingers, one or more cleat-guides leading to the feed-table beneath one or more of the stapling means, means for feeding cleats through said guides, and means for positively engaging the wired slats and withdrawing them from the stapling means so as to preserve the accurate spacing of said slats.

5. In a stapling-machine for attaching one or more continuous wires to a series of slats, the combination, with the feed-table, of one or more staple forming and driving means, a slat-guide leading to the feed-table, a pair of fingers arranged to feed the slats in succession to the stapling means, levers having an adjustable throw for reciprocating said fingers, one or more cleat-guides leading to the feed-table beneath one or more of the stapling means, a pair of chains having teeth for positively engaging the wired slats as they pass from beneath the stapling means, a lever having an adjustable throw for intermittently actuating said chains, feed-rolls for engaging the cleats, and a driving connection between said chains and the cleat-feed rolls.

6. In a stapling-machine, the combination, with the feed-table, of the staple-driving mechanism, a slat-guide leading to the table, a reciprocating feeding device arranged to engage the slats in succession and push them beneath the staple-drivers, and a separate intermittently-operated take-away device arranged to engage said slats on the opposite side of said table and keep the stapled product pulled away as the work proceeds, substantially as set forth.

7. In a stapling-machine, the combination, with the staple-driving means, of a clenching-anvil coöperatively mounted therewith, a clenching-hammer mounted to reciprocate in a perforation in said anvil, its operating-face normally forming the bottom of a recess in said anvil, the vertically-reciprocating bar 76 mounted on movable supports which rest in their lowermost position on fixed rests, said reciprocating bar supporting in turn the lower end of said hammer, and a cam-operated device for intermittently driving said bar and hammer carried thereby upward, substantially as set forth.

8. In a stapling-machine, the combination, of the table, the slat-guides leading thereto, the reciprocating feeders for the slats, the stapling mechanism, the means for feeding the longitudinal wires intermittently, the longitudinal cleat-guides, and the separate feeding mechanism for the longitudinal cleats, substantially as set forth.

9. In a stapling-machine, the combination, of the frame, the reciprocating head 21, the bar 35, the stapling-heads adjustably mounted thereon, the reciprocating hammer-bars, each mounted in a way in one of said heads and



secured at its upper end to the head 21, the  
movable swage, a bifurcated follower ar-  
ranged to straddle said swage and reciprocate  
upon the projecting portion of the hammer-  
5 head, a dog pivoted on the hammer-bar and  
engaging the follower, a trip for throwing  
said dog out of engagement located to act  
when the follower has reached the bottom of  
the way, means carried by the hammer-bar  
10 for throwing back said swage at the same  
time, the anvil and cooperating clenching-  
hammer, means for operating the same, means

for feeding the slats and wires to the ma-  
chine, and separate means for drawing the  
finished work away, all substantially as set 15  
forth.

In witness whereof I have hereunto set my  
hand and seal, at Indianapolis, Indiana, this  
21st day of April, A. D. 1899.

JASON H. GREENSTREET. [L. S.]

Witnesses:

CHESTER BRADFORD,  
JAMES A. WALSH.