No. 763,218. PATENTED JUNE 21, 1904.

E. J. STEWART.

PAD FORMING MACHINE.

APPLICATION FILED SEPT. 22, 1903.

NO MODEL. 7 SHEETS—SHEET 1.

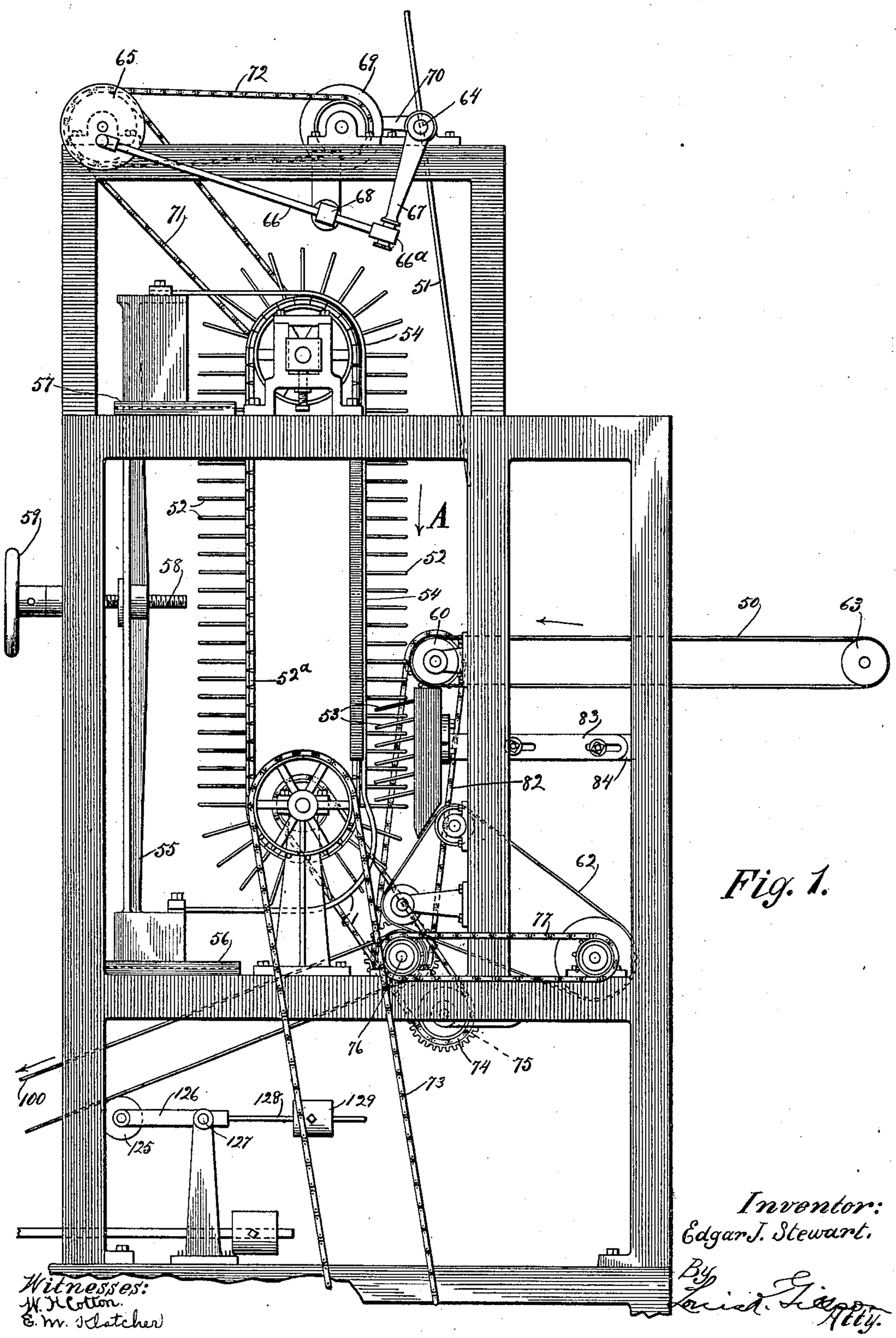

Fig. 1.

Witnesses:
W. H. Cotton.
E. W. Hatcher

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Edgar J. Stewart.
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NO MODEL. 7 SHEETS—SHEET 2.

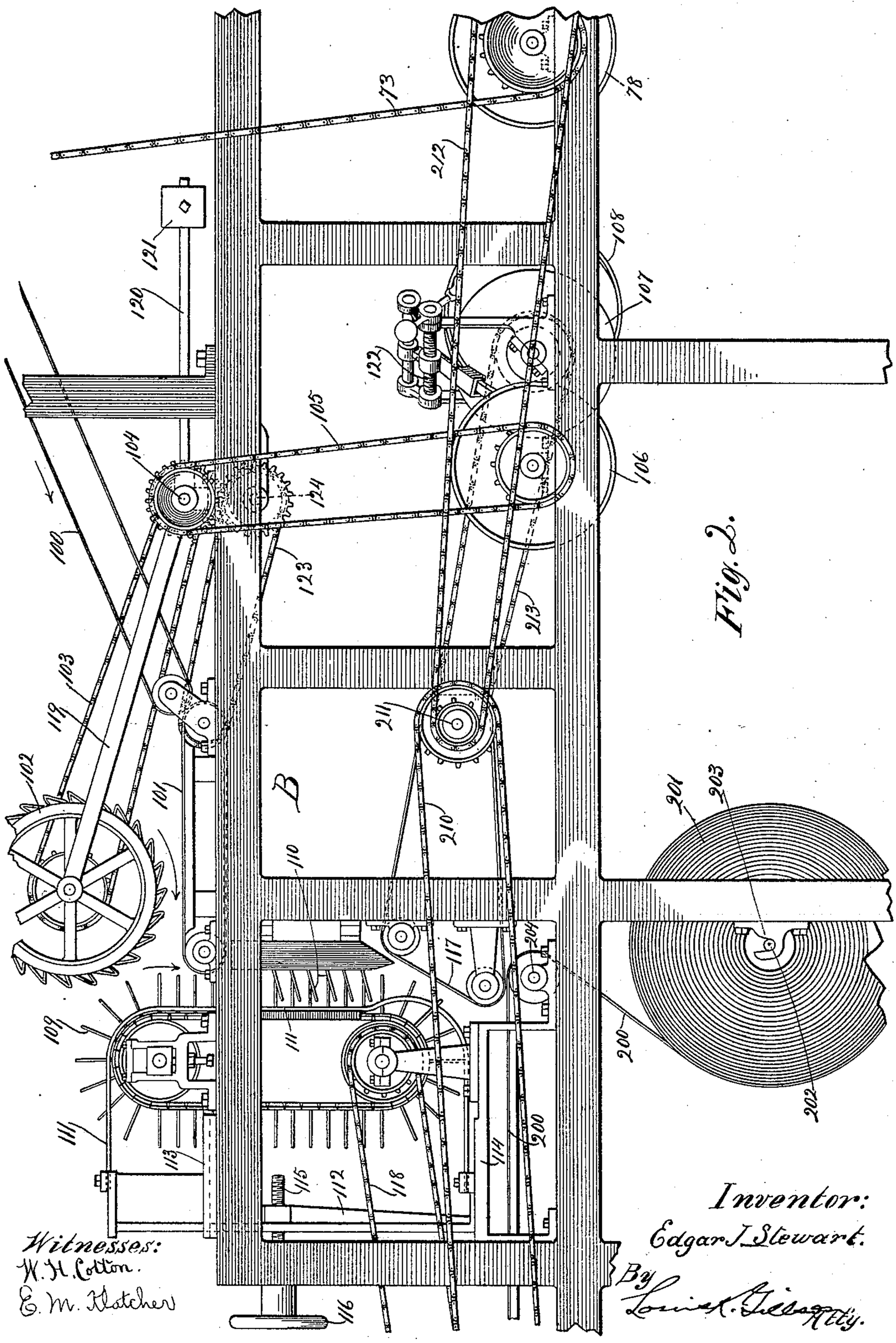

Fig. 2.

Witnesses:
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NO MODEL. 7 SHEETS—SHEET 3.

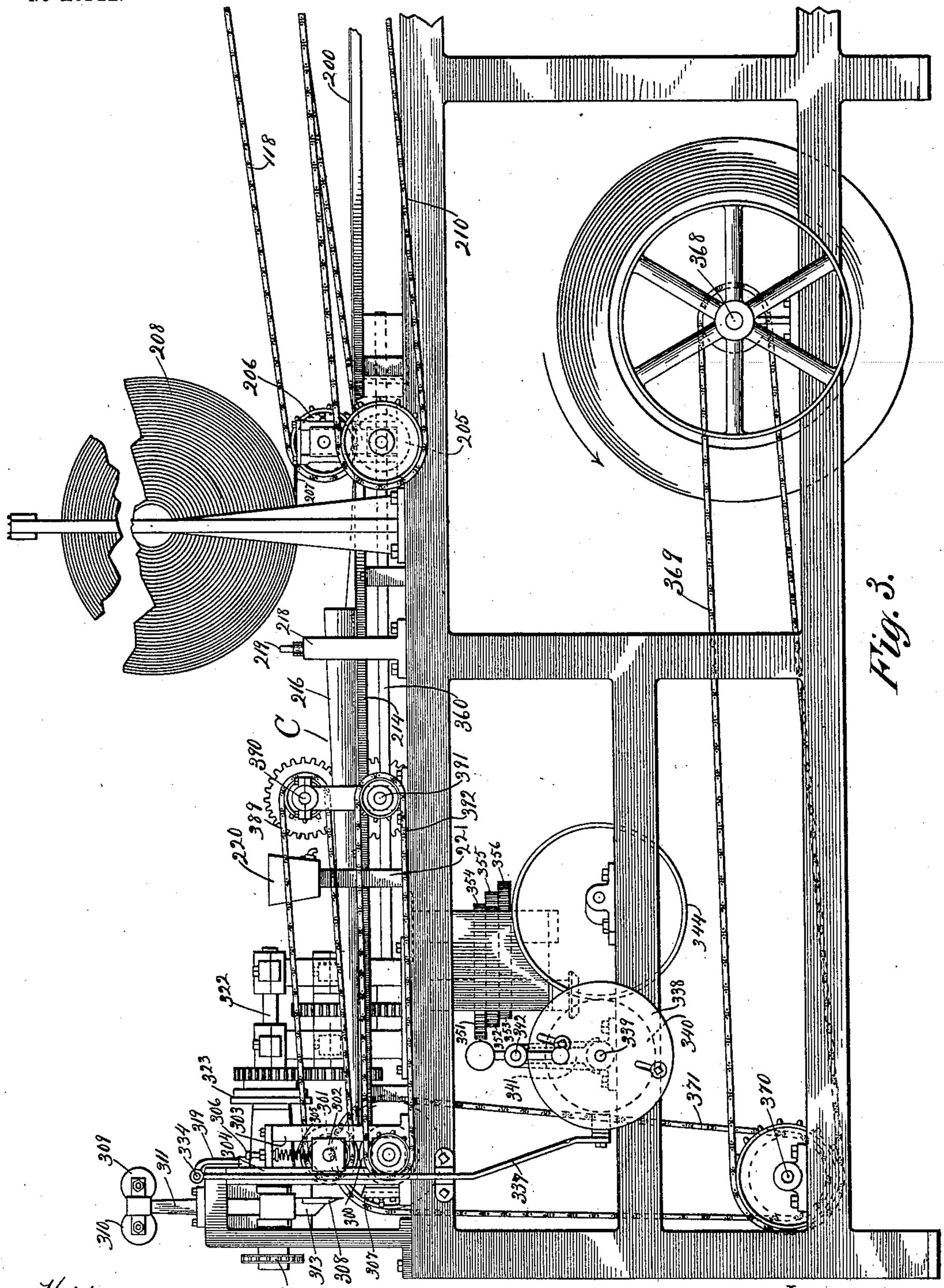

Fig. 3.

Witnesses:
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NO MODEL. 7 SHEETS—SHEET 4.

Fig. 5.

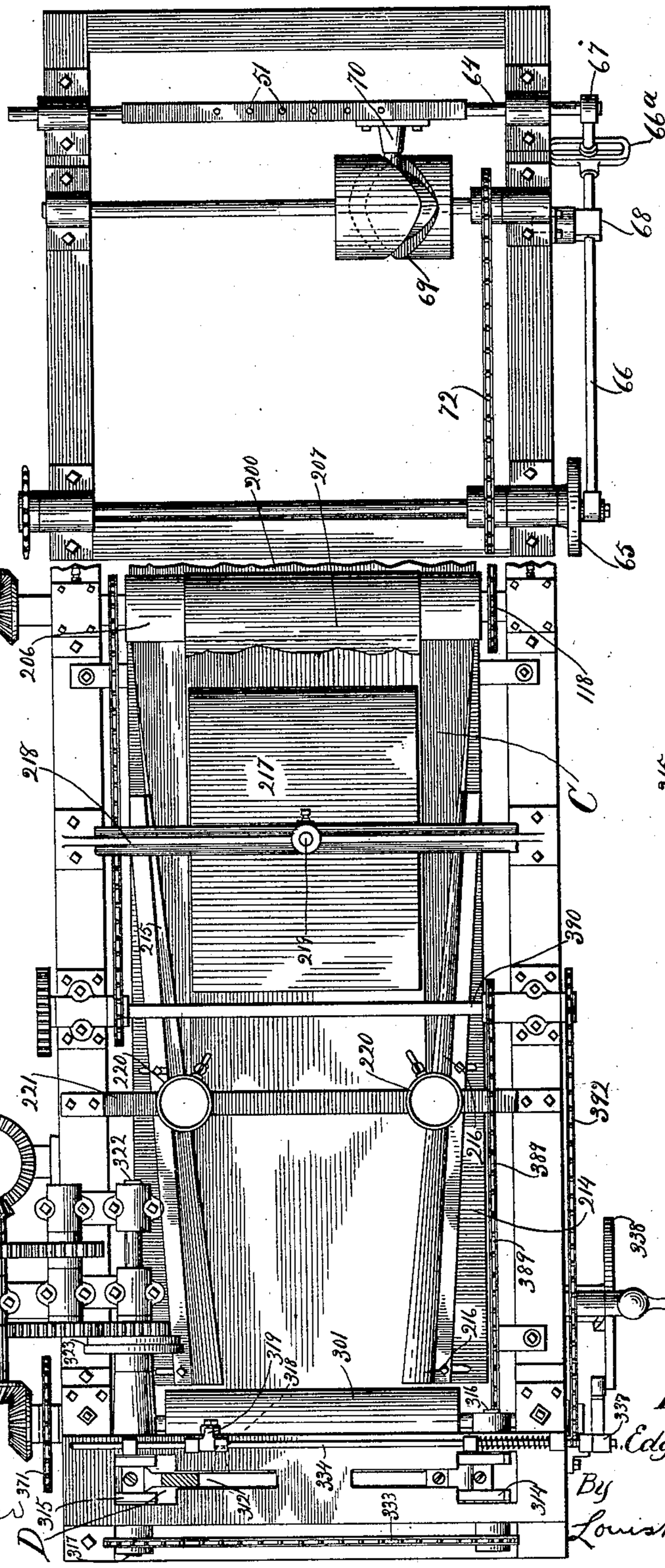

Fig. 4.

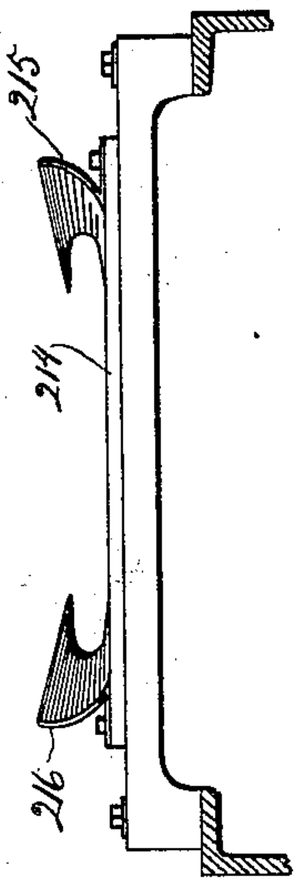

Fig. 7.

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NO MODEL. 7 SHEETS—SHEET 5.

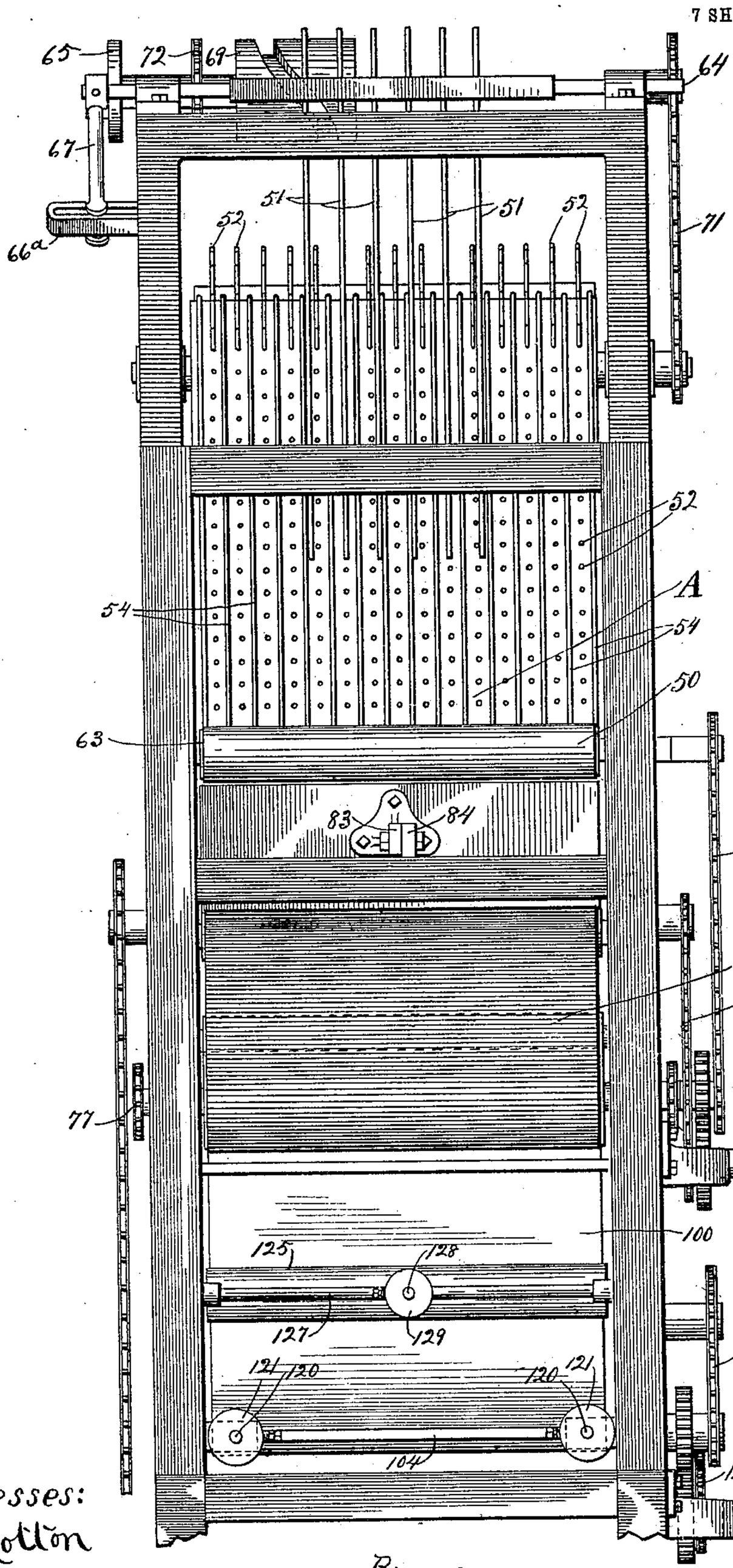

Fig. 6.

Witnesses:
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No. 763,218. PATENTED JUNE 21, 1904.

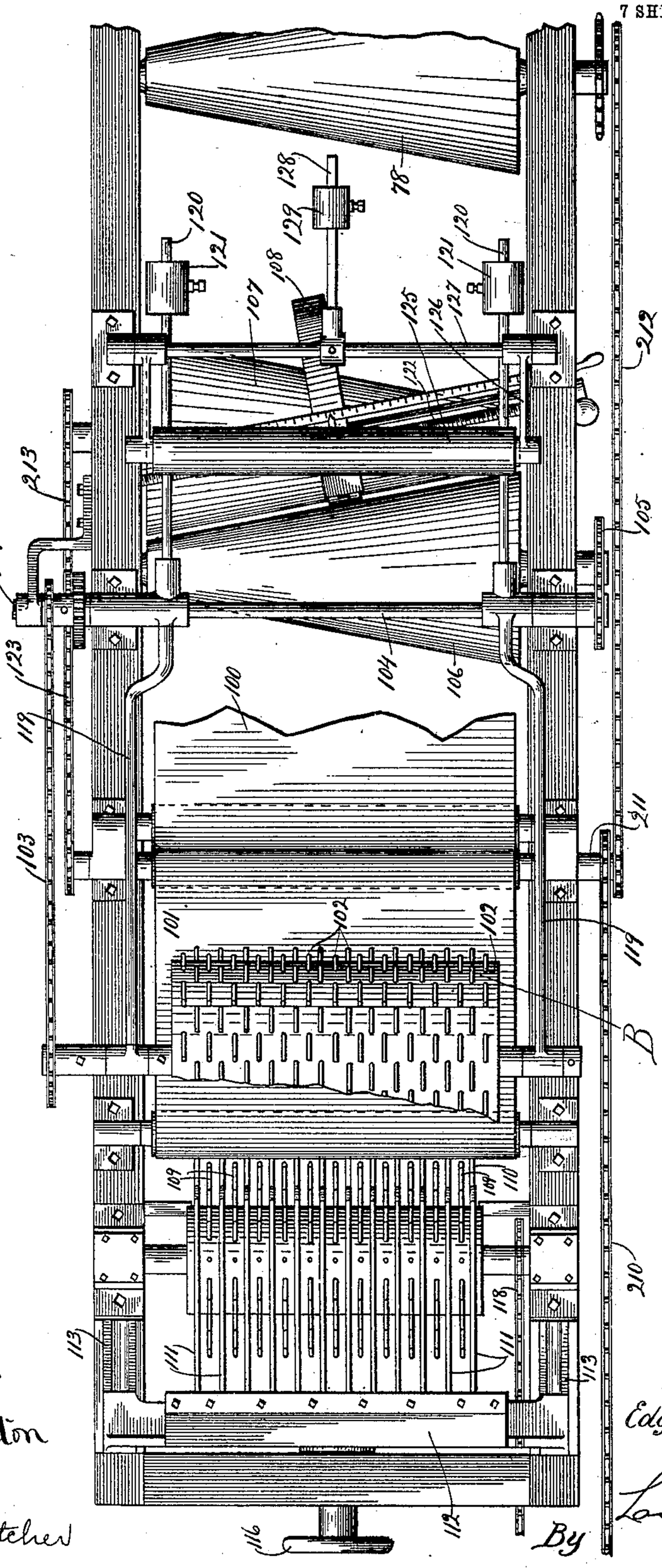
E. J. STEWART.

PAD FORMING MACHINE.

APPLICATION FILED SEPT. 22, 1903.

NO MODEL. 7 SHEETS—SHEET 6.

Fig. 8.



Witnesses:

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No. 763,218. PATENTED JUNE 21, 1904.

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PAD FORMING MACHINE.

APPLICATION FILED SEPT. 22, 1903.

NO MODEL. 7 SHEETS—SHEET 7.

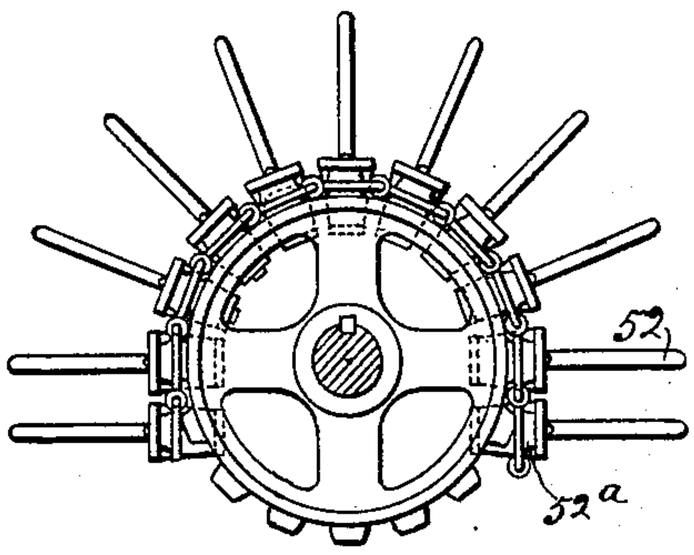

Fig. 10.

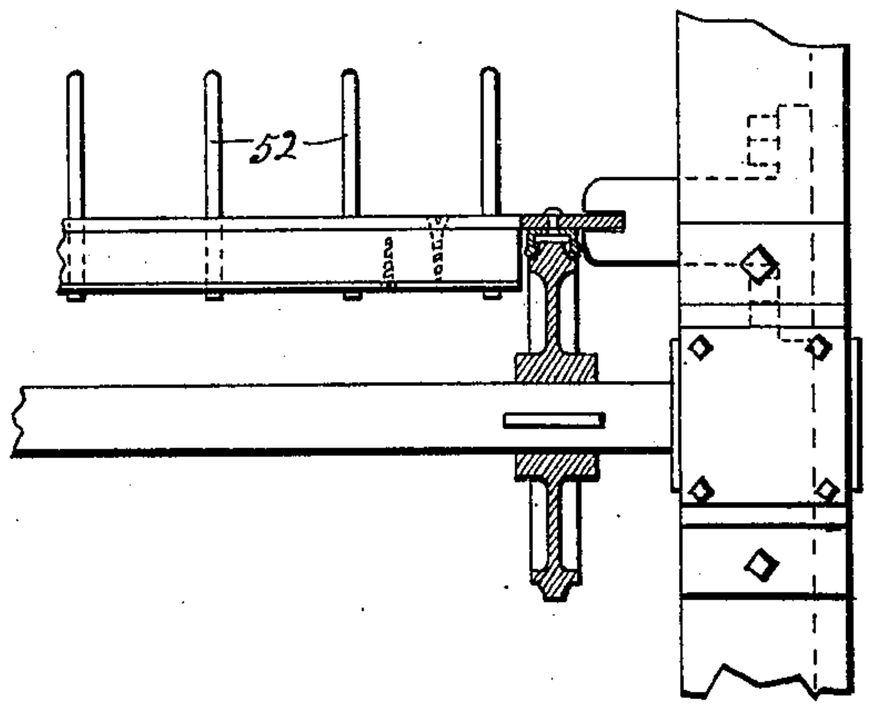

Fig. 11

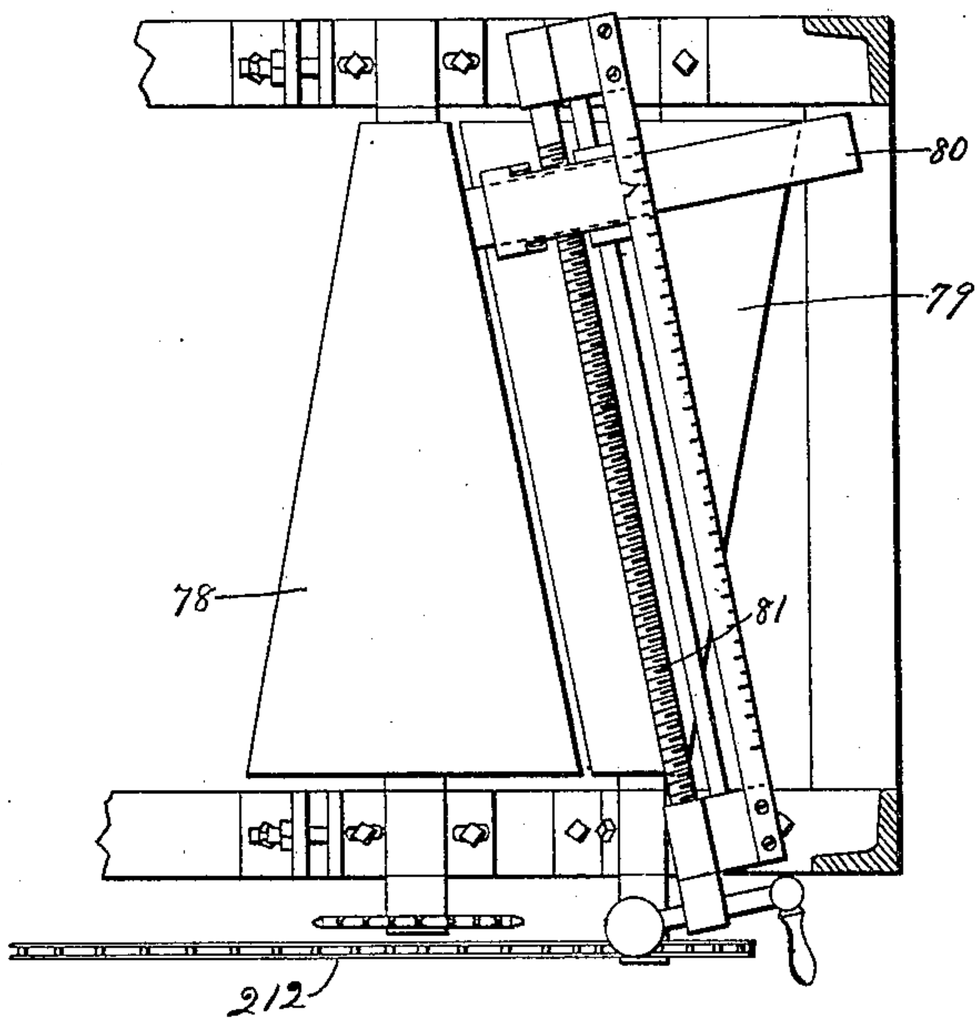

Fig. 9

Witnesses:
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Inventor:
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By Louis A. Gibson Atty.

No. 763,218. Patented June 21, 1904.

UNITED STATES PATENT OFFICE.

EDGAR J. STEWART, OF CHICAGO, ILLINOIS.

PAD-FORMING MACHINE.

SPECIFICATION forming part of Letters Patent No. 763,218, dated June 21, 1904.

Application filed September 22, 1903. Serial No. 174,166. (No model.)

To all whom it may concern:

Be it known that I, EDGAR J. STEWART, a citizen of the United States, and a resident of Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Pad-Forming Machines, of which the following is a specification and which are illustrated in the accompanying drawings, forming a part thereof.

The invention relates to machines for the manufacture of packing-pads, and particularly such pads when made of excelsior and having a paper jacket.

The object of the invention is to provide a machine of this character which shall be simple and accurate in all of its operations and of large capacity.

The invention consists of various parts and arrangement of parts, as hereinafter described and as illustrated in the accompanying drawings, in which—

Figure 1 is a partial side elevation of the upper part of the machine. Figs. 2 and 3 are side elevations of the lower part of the machine. Fig. 4 is a plan showing the folding and cutting mechanism. Fig. 5 is a plan of the extreme upper part of the machine. Fig. 6 is an end elevation of the machine. Fig. 7 is an end view of the folding device. Fig. 8 is a plan view, parts of which are cut away for better illustration. Fig. 9 is a plan of the rear variable-speed mechanism. Figs. 10 and 11 are details.

The machine may be considered, for the purpose of description, under four general subdivisions. At A is represented the mechanism for straightening and carding the excelsior; at B, the mechanism for regulating the feed thereof and still further straightening and carding; at C, mechanism for inclosing the filling material in a casing and forming a continuous pad, and at D mechanism for cutting the pad into suitable lengths.

The filling material, which, being usually excelsior, will be hereinafter referred to by that name, is deposited upon an endless feed-apron 50, which travels in the direction represented by the arrow in Fig. 1. While still upon this apron, the excelsior is acted upon by the spreading-fingers 51, which have a motion transverse to the direction of movement of the apron and also longitudinally therewith and tend to break up or separate any masses or bunches of the material.

The apron 50 delivers the excelsior to an endless conveyer provided with projecting teeth 52, arranged in longitudinal series and traveling in the direction of the arrow, Fig. 1, past a fixed set of teeth 53, whereby the material is carded or combed, so that its fibers are drawn into substantially parallel relation.

A series of rods 54 are located one between each pair of the longitudinal series of teeth 52. These rods are carried by an adjustable frame 55, sliding upon ways 56 57 and controlled by a screw-rod 58, carrying a hand-wheel 59, so that the rods may be moved to and from the bases of the teeth, thus contracting and opening the throat of the machine, which may be regarded as the space between the roller 60, over which the apron 50 turns, and the rods 54. The lower ends of the rods 54 project beyond the teeth 52, as shown at 61, and are preferably curved outwardly below the teeth 53, so that they serve the purpose of disengaging the excelsior from the teeth 52 and throwing it against a feed-belt 62, which carries it downwardly and delivers it to a feed-belt 100, conveying it in the direction of the arrow, Fig. 1, to the section B of the machine.

The feed-apron 50 turns over the roller 60, previously mentioned, and the roller 63. The fingers 51 are fixed to a shaft 64, oscillating in suitable bearings and having also a longitudinal movement therein. The oscillatory movement of this shaft is communicated to it from a crank-wheel 65, by means of a pitman 66, attached to a crank-arm 67 on the shaft, the pitman being guided by a block 68, through which it slides, and which is swiveled on a suitable bracket. The longitudinal motion of the shaft is communicated to it by means of a cylindrical cam 69, which engages an arm 70 on the shaft. In order to provide for the longitudinal movement of the shaft relatively to the pitman 66, the latter is connected with the crank-arm 67 by means of a loop 66^a, through which the crank-arm plays.

The crank-wheel 65 is rotated by means of

a sprocket-chain 71, turning over a suitable sprocket-wheel on its shaft and being driven from a sprocket-wheel carried by the shaft of the upper drum of the belt carrying the teeth 52. The cam 69 is rotated by means of a sprocket-chain 72, driven from the shaft of the crank-wheel 65 and engaging the sprocket-wheel on the shaft of the cam. The last-named belt is driven by means of a sprocket-chain 73, turning over a sprocket-wheel fixed on the shaft of the lower drum, about which this apron turns.

The feed-belt 100 is driven from the shaft of the lower drum, which drives the toothed belt 52[a] and sprocket-chain 74 leading therefrom and driving a stud-shaft 75, which is intergeared with the shaft 76 of the roller, about which the belt 100 turns. The feed-belt 62 is driven by means of a sprocket-chain 77, driven from the shaft 76, and leading to the shaft of one of the rollers about which the belt turns.

The sprocket-chain 73 is driven from the shaft of the friction-cone 78, which is driven from a similar cone 79 through the medium of a shiftable ring 80, controlled by means of a screw-rod 81, thereby providing for the regulation of the speed of the various movable parts of section A of the machine and of the feed-belt 100 leading therefrom.

The feed-apron 50 is driven by means of a sprocket-chain 82, leading from the shaft 76 to one of the rollers 60, carrying the apron 50.

The comb 53 may be made adjustable toward and from the toothed belt 52[a], and to this end the block of the comb is provided with an arm 83, which is bolted to a bracket-arm 84, fixed to the frame of the machine, the bolt-holes being elongated, as slots, to provide for longitudinal adjustment of the arm 83 upon the bracket.

Referring now to section B of the machine, the material is conveyed thereto by the apron 100, being delivered upon a feed-belt 101, running in the direction of the arrow, Fig. 2, and conveying and discharging the material to a second combing or carding device similar to the one already described.

While the material is yet on the apron 101, it is engaged by a regulating-drum running in the direction of the arrow, Fig. 2, and composed of a number of toothed disks 102, spaced a little apart. This regulating-drum coöperates with the apron 101 to feed the material and to regulate the speed at which it is fed, provision being made for varying the velocity of the drum and the feed-apron. The drum is driven by means of a sprocket-chain 103, actuated by a sprocket-wheel mounted upon a shaft 104, and which in turn is driven by a sprocket-chain 105, actuated from the shaft of a friction-cone 106, which is driven by a friction-cone 107 through the medium of a shiftable endless strap 108, running between the two cones. The carding mechanism of this section of the machine comprises the teeth 109, set in an endless belt which runs in the direction of the arrow, Fig. 2, and carries the material past the fixed combing-teeth 110. Rods 111 lie between the several longitudinal series of teeth 109 and are carried by an adjustable frame 112, sliding on the ways 113 114 and controlled by means of a screw 115, carrying a hand-wheel 116, so that the rods may be moved toward and from the bases of the teeth 109, thereby widening or contracting the throat of this mechanism, which may be regarded as between the roller about which the apron 101 turns and the rods 111. The lower ends of the rods 111 project below the teeth 109 as the apron carrying them turns about the lower roller upon which it is mounted and are preferably bent outwardly, as shown, so as to effectually strip the material from the teeth 109 and deflect it toward the carrying-belt 117.

The belt carrying the teeth 109 is driven by means of a sprocket-chain 118, turning about the sprocket-wheel carried by the shaft of the lower drum upon which the belt is carried.

The regulating-drum 102 is carried by a swinging frame 119, pivoted upon the shaft 104, from which the sprocket-chain 103, driving the drum, is actuated. Arms 120 120 project backwardly from the frame 119 and carry counterweights 121 121, slidable upon the arms, whereby the pressure of the regulating-drum upon the material carried by the belt 101 may be regulated. Preferably the frame carrying the regulating-drum is nearly at an equipoise, the drum but slightly overbalancing the counterweights. Should the material be bunched, the teeth of the drum will be drawn down. The fingers 109 engage the material and draw it forward from between the belt and drum, thereby straightening it and insuring an even distribution.

The friction-band 108, which coöperates with the friction-cones 106 107, is shifted by means of a screw-rod 122 for the purpose of varying the speed of the regulating-drum and of the feed-belt 101, the latter belt being driven by a sprocket-chain 123, driven from the stud-shaft 124, intergeared with the shaft 104.

The tension of the feed-apron 100 is regulated by means of a roller 125, carried by a frame 126, pivoted at 127 to a bracket secured to the frame of the machine, a rearwardly-projecting arm 128 of the frame 126 carrying an adjustable counterweight 129.

The material is discharged by means of the belt 117 to a strip of paper which is led from a spool 201, supported by means of trunnions 202 in hook form, of boxes 203, the paper being turned over a guide-roller 204 and led thence to a pair of feed-rollers 205 206, Fig. 3, and onto a pair of feed-rollers 300 301, forming a part of the fourth section, D, of the machine. A second strip of paper 207 is de-

livered from a spool 208, mounted in suitable brackets rising from the frame of the machine about the roller 206, passing between it and the roller 205. The material having been delivered to the lower strip of paper 200 before reaching these rollers, the upper strip 207 is consequently laid down on top of it and the three elements are carried forward to the folding and gumming mechanism.

The roller 205, over which the lower sheet of paper 200 is laid, is driven by means of a miter-gear 209, fixed upon the shaft 360 and intermeshing with a similar gear on the shaft of the roller. From the same shaft there is driven a sprocket-chain 210, which turns a power-distributing shaft 211, from which the friction-cone 79 is driven by a sprocket-chain 212 and the cone 107 by a sprocket-chain 213, the shaft 211 also carrying one of the rollers about which the feed-belt 117 turns.

A table 214 leads from the roller 205 to the feed-roller 300, the forming-pad being carried over this table. The former consists of a pair of sheet-metal plates 215 216. These plates rise from the table and are curved toward each other and converge toward the feed-roller, their curvature increasing toward their converging ends.

A shoe 217 is carried by a bracket-frame 218, arching over the table 214, the shoe consisting of a sheet-metal plate secured by a stem 219, which depends from the arch 218 and is vertically adjustable therein. The function of this shoe is to bear lightly upon the forming-pad, so as to maintain its flat form. As the material passes under the shoe the edges of the lower sheet 200 are curved upwardly by the forming-plates 215 216 and gradually bent over the upper sheet. Just before these overturned edges are curved downwardly glue or similar material is dropped upon the lower sheet from the pots 220 220, carried by the frame 221, arching over the table 214. The former-plates bring the edges of the lower sheet down upon the glued margins of the upper sheet and the gluing operation is completed by the pressure of the feed-roller 301 upon the pad as it passes over the roller 300.

Referring now to the cutting mechanism, (section D of the machine,) the lower feed-roller 300 is journaled in fixed bearings, and the upper roller 301 is journaled in bearing-blocks 302, which slide between vertical ways 303 304 and are held down by the springs 305, reacting between these blocks and adjusting-screws 306, by means of which their tension may be regulated.

The completed pad is delivered in a continuous strip over the stationary knife 307, with which the cutting-blade 308 coöperates. This blade is given a quick downward longitudinal and upward movement by the action of a pair of retractile springs carried in the telescoping housings 309 310, the springs reacting between a fixed bracket 311 and an arm 312, projecting upwardly from the knife-carrier 313. This carrier is supported by a pair of crank-arms 314 315, fixed to a pair of shafts 316 317, journaled in suitable framing.

The mechanism hereinafter described is provided for carrying the knife to a position of rest against the resistance of its actuating-springs and is arrested by the contact of a pin 318, set in the knife-carrier 313, coming in contact with a hooked oscillating detent 319. When in this position, the crank-arms 314 315 are inclined downwardly slightly from the centers of their shafts, so that upon the release of the pin 318 by the detent the knife is thrown by the action of the springs, its crank-shafts turning through approximately one hundred and eighty degrees, thereby carrying the knife through the material with a shearing cut, but with such quick action that the section of pad is cut off without arresting the advance movement of the material as it is fed forward by the rollers 300 and 301, the cut being made so quickly that it is perfectly straight.

The shaft 317 is actuated from a shaft 322 through clutch mechanism 323, the shaft 322 being driven through the medium of a train of gears actuated from the shaft 360, which is driven from the power-shaft 368, a sprocket-chain 369 leading therefrom and driving a counter-shaft 370, a sprocket-chain 371 leading from the latter shaft to the shaft of the roller 300, the latter shaft driving the shaft 360 by means of a pair of intermeshing miter-gears carried thereby.

The detent 319 is controlled by means of a reciprocating rod 334, actuated by means of a lever 337, engaging a cam-disk 338, which is timed to disengage the detent from the stud 318 at such intervals relatively as to the speed of the feed-rollers 300 301 as will cut the material into suitable lengths.

The speed of the tripping mechanism may be varied by the use of a friction-cone 344 for driving the cam-disk 338 through the medium of a friction-wheel 340, splined upon the shaft 339 of the disk 338 and movable by means of a yoke 341, carried by a screw-rod 342. This action may be still further varied by the employment of differential gears 351 352 353, coöperating with driving-gears 354, 355, and 356, suitable clutch mechanism being employed for accomplishing the engagement of any one of these three pairs of gears, one set of gears being carried by the shaft engaging the shaft of the cone 344 through the medium of a pair of miter-gears and the other set of gears being carried by a shaft driven from the shaft 360 through the medium of a pair of miter-gears.

The shaft 316 is caused to move in unison with the shaft 317, the two being united by a sprocket-chain 333.

The upper feed-roller 301 is driven by means

of a sprocket-chain 389, driven from a shaft 390, intergeared with a shaft 391, which is driven by a sprocket-chain 392, leading from the shaft of the roller 300.

The operation of the machine is as follows: The material is delivered to the feed-apron 50 and is loosened and spread by the action of the stirring-fingers 51 and is discharged to the combing or carding device, being received by the fingers 52 and carried past the comb-teeth 53 to the feed-belt 62, the lower ends 61 of the rods 64 effectually cleaning it from the fingers or teeth 52 of the feed-belt. From the belt 62 it is delivered to the feed-belt 100, which conveys it to the second section of the machine, discharging it upon the feed-belt 101, where by the action of this belt and the regulating-drum the feed is still further controlled for the purpose of maintaining uniform thickness of the pad. The feed-apron 101 delivers the material to the second combing or carding device, it being received by the fingers or teeth 109, which carry it down past the comb-teeth 110 and deliver it to the feed-belt 117, which discharges it upon the lower sheet of paper 200, which is fed forward by the action of the feed-rollers 300 301. As the sheet 200 advances with its load of material to the table 214 it is covered by the upper sheet 207, fed from the spool 208, and the three elements of the pad now entering the former where the edges of the lower sheet are folded up over the margins of the upper sheet, to which latter glue is applied just before this folding action is completed. Emerging from the former the pad passes between the feed-rollers 300 301, the compression of which completes the gluing or cementing action, and it is then delivered to the cutting mechanism and severed into suitable lengths.

The thickness of the pad is determined by the size of the throat of the machine, which is regulated by the adjustment of the rods 54 relatively as to the teeth or fingers 52, and the speed of the feeding mechanism is varied according to the quantity of material to be delivered by the adjusting of the driving-cones 78 79.

As the material is apt to be delivered from the first carding mechanism somewhat irregularly, because of their regular primary feed to the machine, the material often coming to the machine in bunches, a uniform delivery to the lower sheet 200 of the wrapping is secured by means of the regulating mechanism, consisting of the feed-belt 101 and the regulating-drum 102, the speed of which is controlled by the operator by means of the screw-rod 142 for shifting the band 108, coöperating with the friction-cones 106 107.

I have not herein described in detail the particular mechanism for regulating the action of the cutting mechanism. Such mechanism may be variously worked out; but I prefer to employ that which is made the subject of a copending application filed by myself of even date herewith. In this application I have therefore shown only in a somewhat general way the construction of this mechanism.

I claim as my invention—

1. In a pad-forming machine, in combination, means for straightening fibrous material, means for variably controlling the feed thereof independently of the action of the remainder of the machine, means for continuously feeding two sheets of paper one above and the other below the fibrous material delivered to the machine, and means for securing the sheets together at their edges.

2. In a pad-forming machine, in combination, means for straightening fibrous material, means for variably controlling the feed thereof independently of the action of the remainder of the machine, means for continuously feeding two sheets of paper one above and the other below the fibrous material delivered to the machine, means for securing the sheets together at their edges, and means for cutting the pad thus formed into lengths.

3. In a pad-forming machine, in combination, a feed-belt for carrying fibrous material, fingers projecting downwardly toward the belt and oscillating about a center and in the line of movement of the belt.

4. In a pad-forming machine, in combination, a feed-belt for carrying fibrous material, fingers projecting downwardly over the belt and oscillating about a center in the line of movement of the belt and reciprocating transversely thereto.

5. In a pad-forming machine, in combination, a feed-belt for carrying fibrous material, an oscillating and longitudinally-reciprocating shaft, and fingers set in the shaft and projecting downwardly toward the belt.

6. In a pad-forming machine, in combination, a feed-belt, a fixed comb, a toothed belt having its teeth intermeshing with the teeth of the comb, and rods located between longitudinal series of teeth on the belt and being adjustable to and from their bases.

7. In a pad-forming machine, in combination, a smooth carrying-belt, a toothed drum coöperating therewith, means for varying the speed of the drum and belt, and a picker having teeth engaging the material as it issues from between the drum and belt.

8. In a pad-forming machine, in combination, a smooth carrying-belt, a toothed drum coöperating therewith, means for varying the speed of the drum, and a picker having teeth engaging the material as it issues from between the drum and belt.

9. In a pad-forming machine, in combination, a carding device comprising a fixed comb and an endless toothed belt the teeth of which intermesh with the teeth of the comb, rods located between longitudinal series of

teeth of the toothed belt and movable to and from the bases of the teeth thereof, a feed-belt leading to a descending stretch of the toothed belt, a feed-regulating toothed drum above the feed-belt, and means for varying the speed of the drum independently of that of the other movable parts.

10. In a pad-forming machine, in combination, guide-rolls for leading a continuous sheet of paper, a feed-belt discharging upon the sheet so led, guide-rolls for leading a second continuous sheet of paper to the top of material carried by the first sheet, feed-rolls for drawing the two sheets forward, means for uniting the edges of the two sheets, and means for cutting the material as it issues from the machine.

11. In a pad-forming machine, in combination, a carrying-belt, a feed-regulating drum coöperating with the belt and carried by a counterweighted oscillating frame, and means for driving the belt and the drum at a uniform speed, and means for varying such speed independently of the remainder of the machine.

12. In a pad-forming machine, in combination, a carrying-belt, a feed-regulating drum coöperating with the belt and carried by a counterweighted oscillating frame, means for driving the belt and the drum, and means for drawing the material from between the belt and drum.

13. In a pad-forming machine, in combination, a carrying-belt, a regulating toothed drum coöperating with the belt, an oscillating weighted frame carrying the drum, and a combing-belt crossing the throat between the carrying-belt and drum.

14. In a pad-forming machine, in combination, a carrying-belt, a regulating-drum having teeth directed backwardly, such drum being carried by a counterweighted oscillating frame, means for driving the belt and the drum, and means for drawing the material from between the belt and drum.

15. In a pad-forming machine, in combination, a table, means for feeding a sheet of paper continuously over the table, means for depositing filling material on the sheet, means for feeding a second sheet of paper onto the filling material, upwardly-curved forming-plates adjustably mounted on the table engaging the edges of the lower sheet and folding them over onto the upper sheet.

16. In a pad-forming machine, in combination, a table, means for feeding a sheet of paper continuously over the table, means for depositing filling material on the sheet, means for feeding a second sheet of paper onto the filling material, upwardly-curved forming-plates adjustably mounted on the table so as to engage the edges of the paper, such plates converging toward the delivery end of the machine.

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