No. 749,458. PATENTED JAN. 12, 1904.

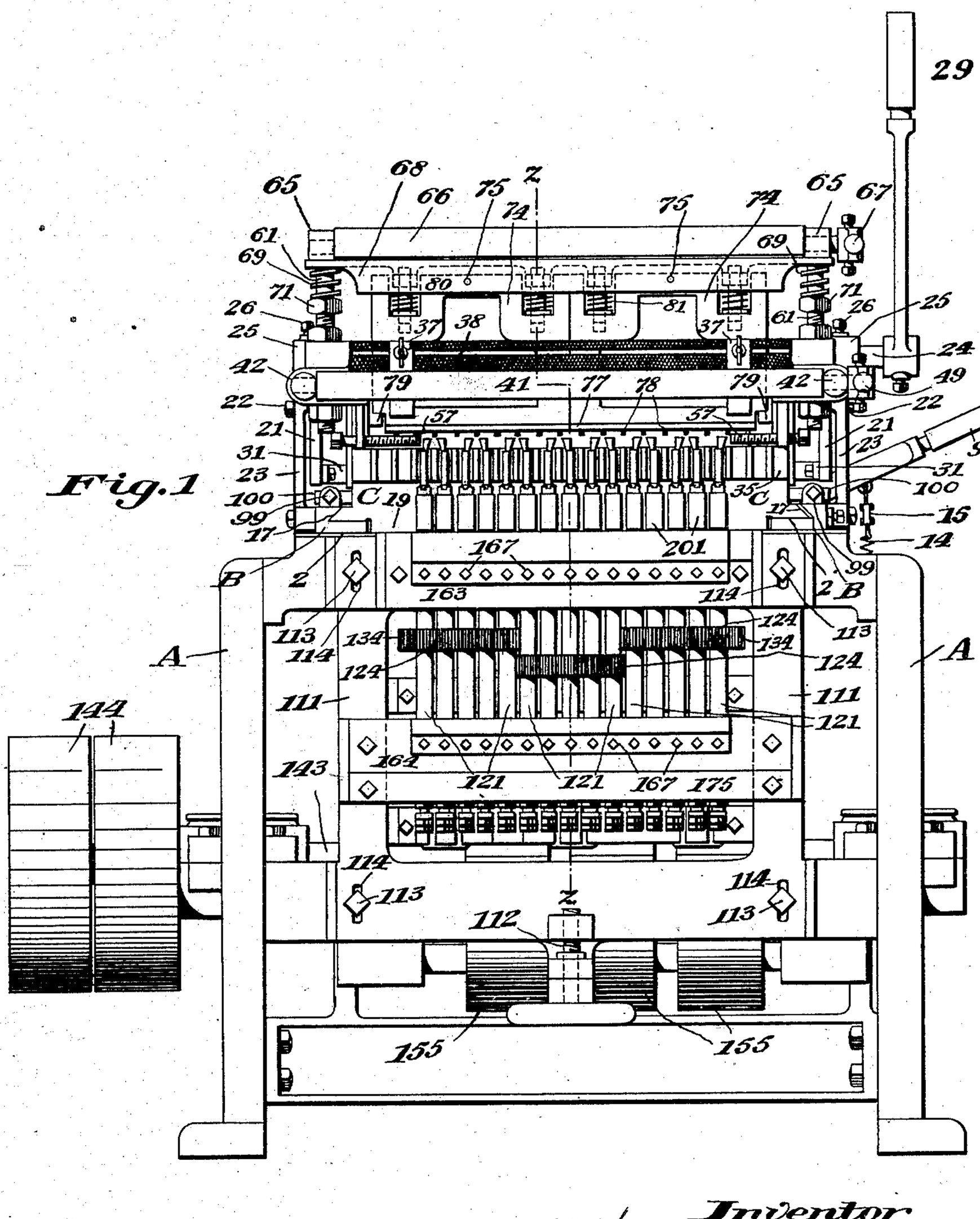
H. S. SPENCER.

DOVETAILING MACHINE.

APPLICATION FILED FEB. 27, 1902.

NO MODEL. 6 SHEETS—SHEET 1.

Fig. 1



Witnesses

J. D. Thorne

H. F. Harden

Inventor

Harry S. Spencer

by P. D. Dewhirst

His Attorney.

No. 749,458. PATENTED JAN. 12, 1904.

H. S. SPENCER.

DOVETAILING MACHINE.

APPLICATION FILED FEB. 27, 1902.

NO MODEL. 6 SHEETS—SHEET 2.

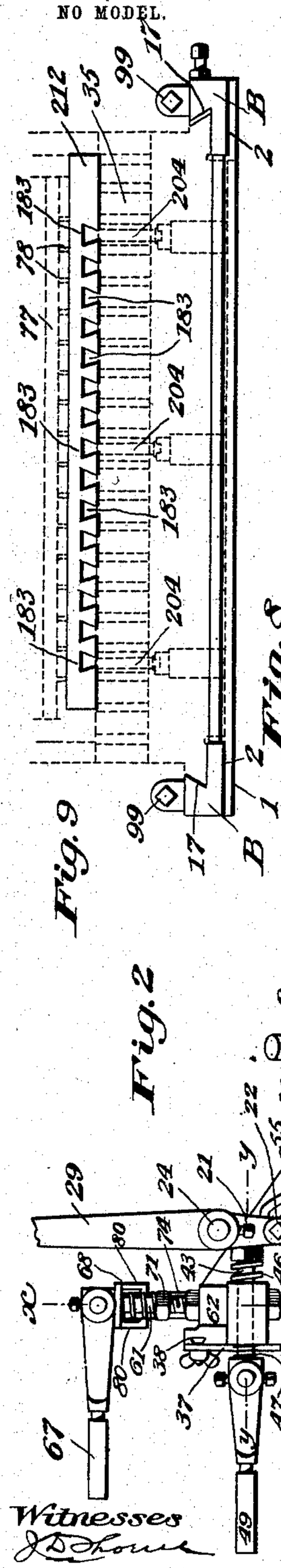


Fig. 8

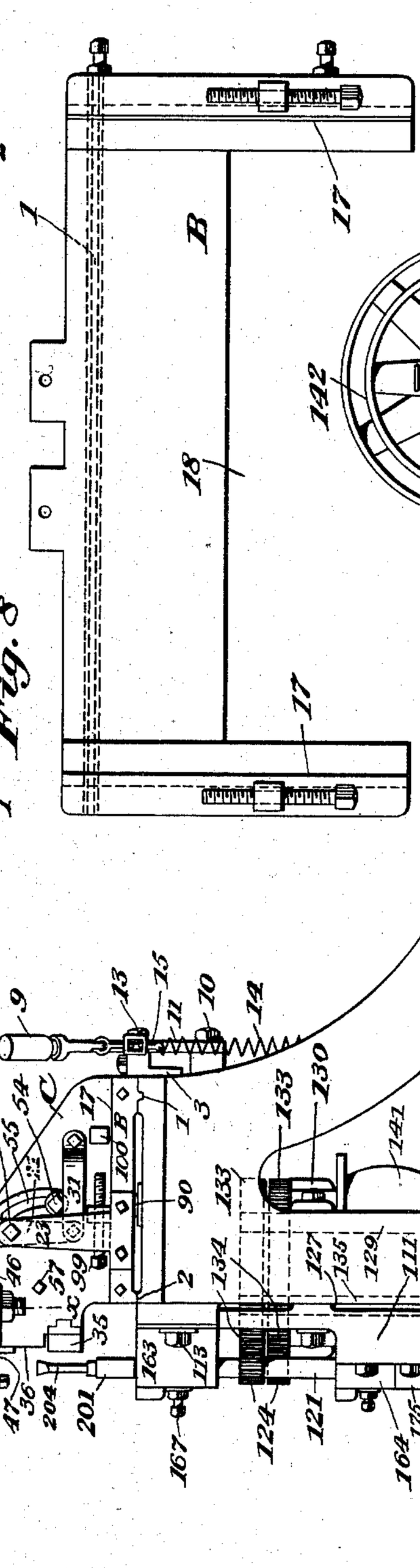


Fig. 9

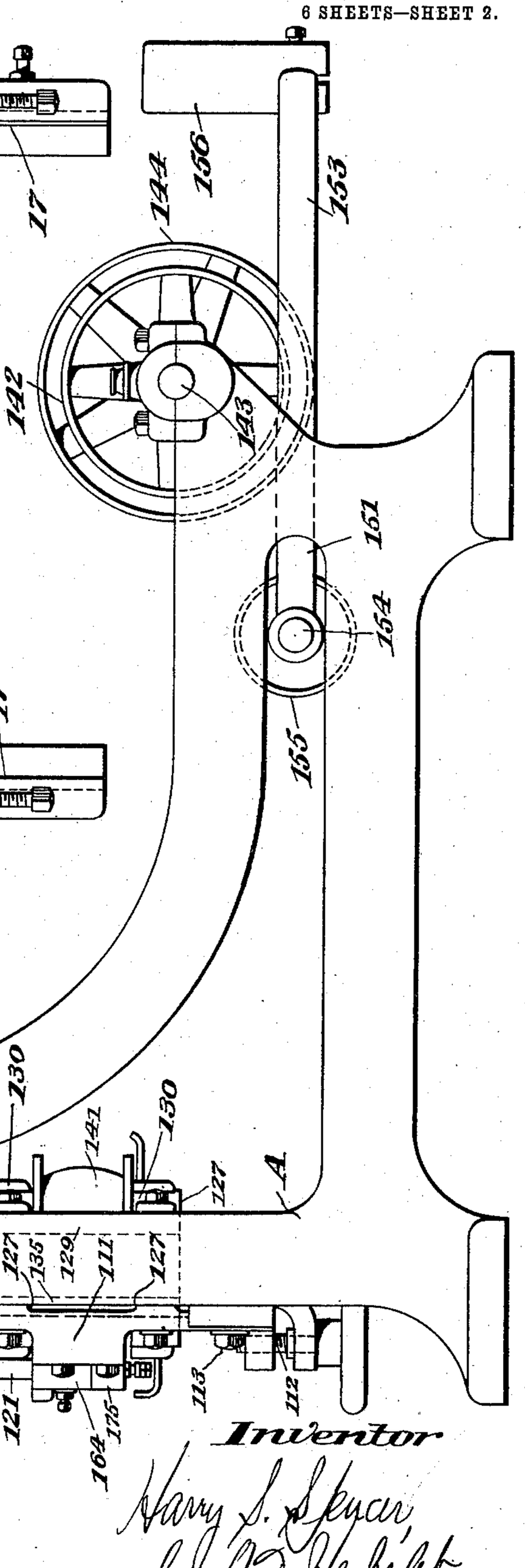
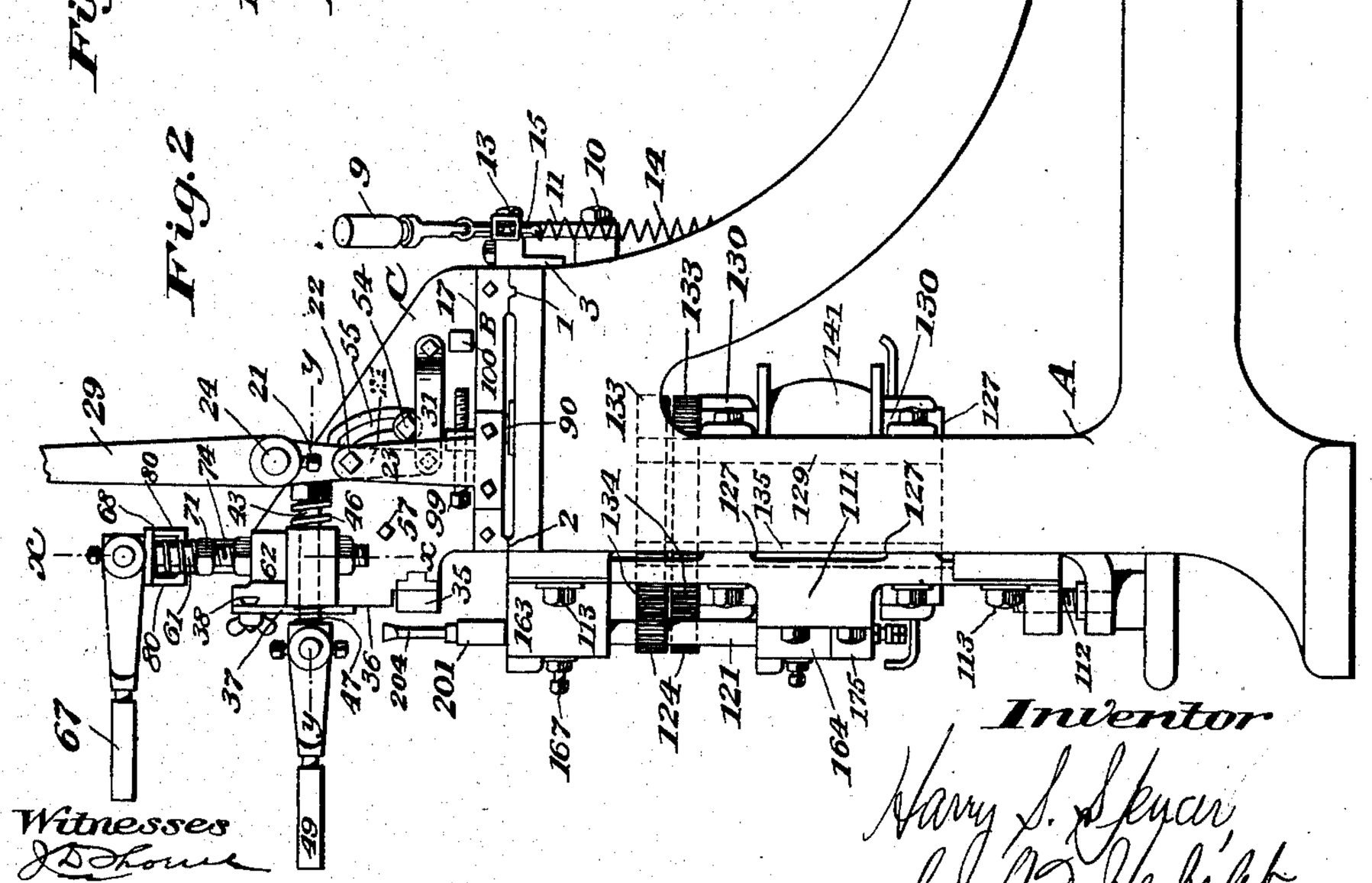


Fig. 2



Witnesses

J. D. Howe

H. F. Harden

Inventor

Harry S. Spencer,

by D. D. Hazlett

his Attorney

No. 749,458. PATENTED JAN. 12, 1904.

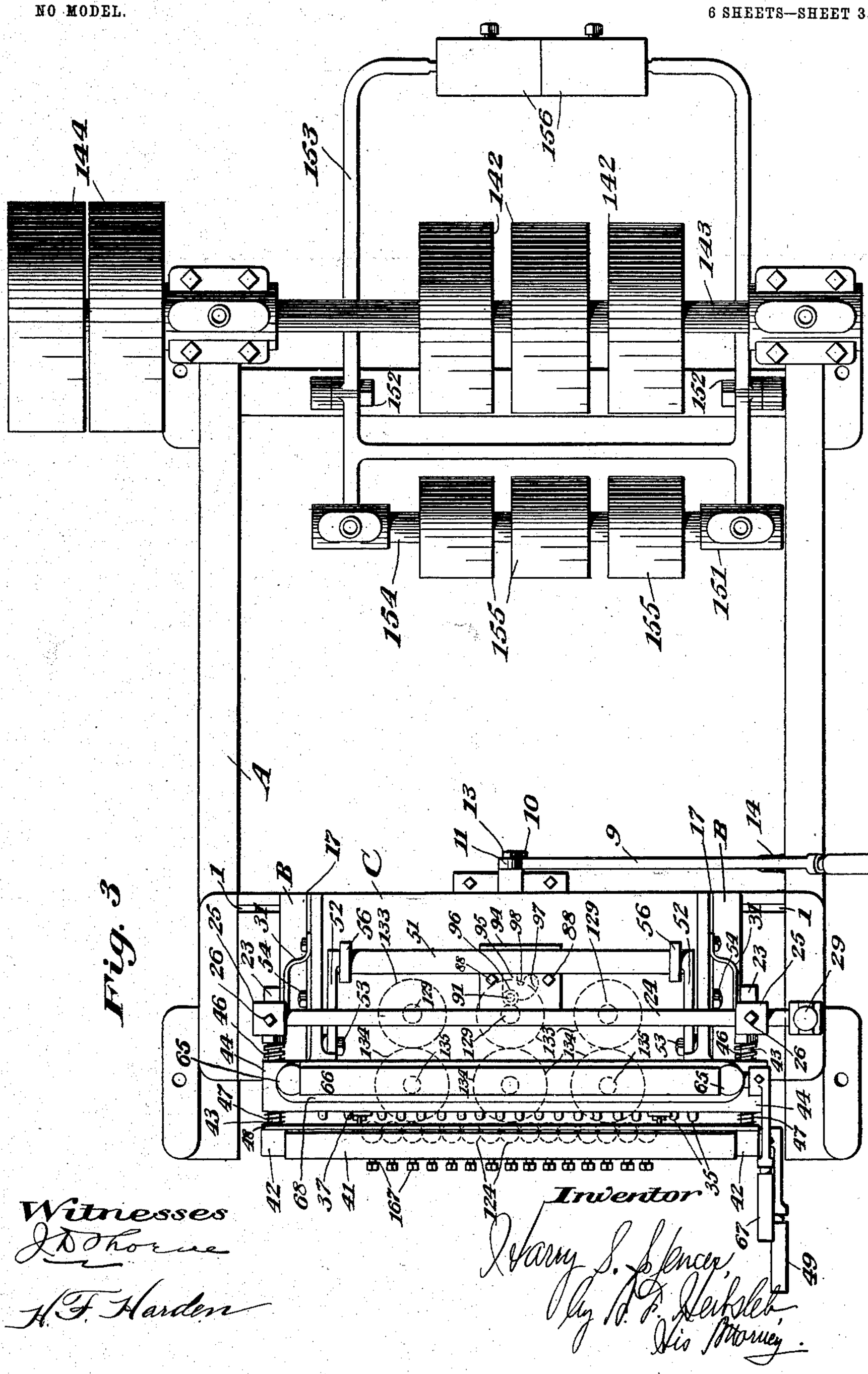
H. S. SPENCER.

DOVETAILING MACHINE.

APPLICATION FILED FEB. 27, 1902.

NO MODEL. 6 SHEETS—SHEET 3.

Fig. 3



Witnesses

J. D. Thorne

H. F. Harden

Inventor

Harry S. Spencer,

by D. F. Liebsleb

his Attorney.

No. 749,458. PATENTED JAN. 12, 1904.

H. S. SPENCER.

DOVETAILING MACHINE.

APPLICATION FILED FEB. 27, 1902.

NO MODEL. 6 SHEETS—SHEET 4.

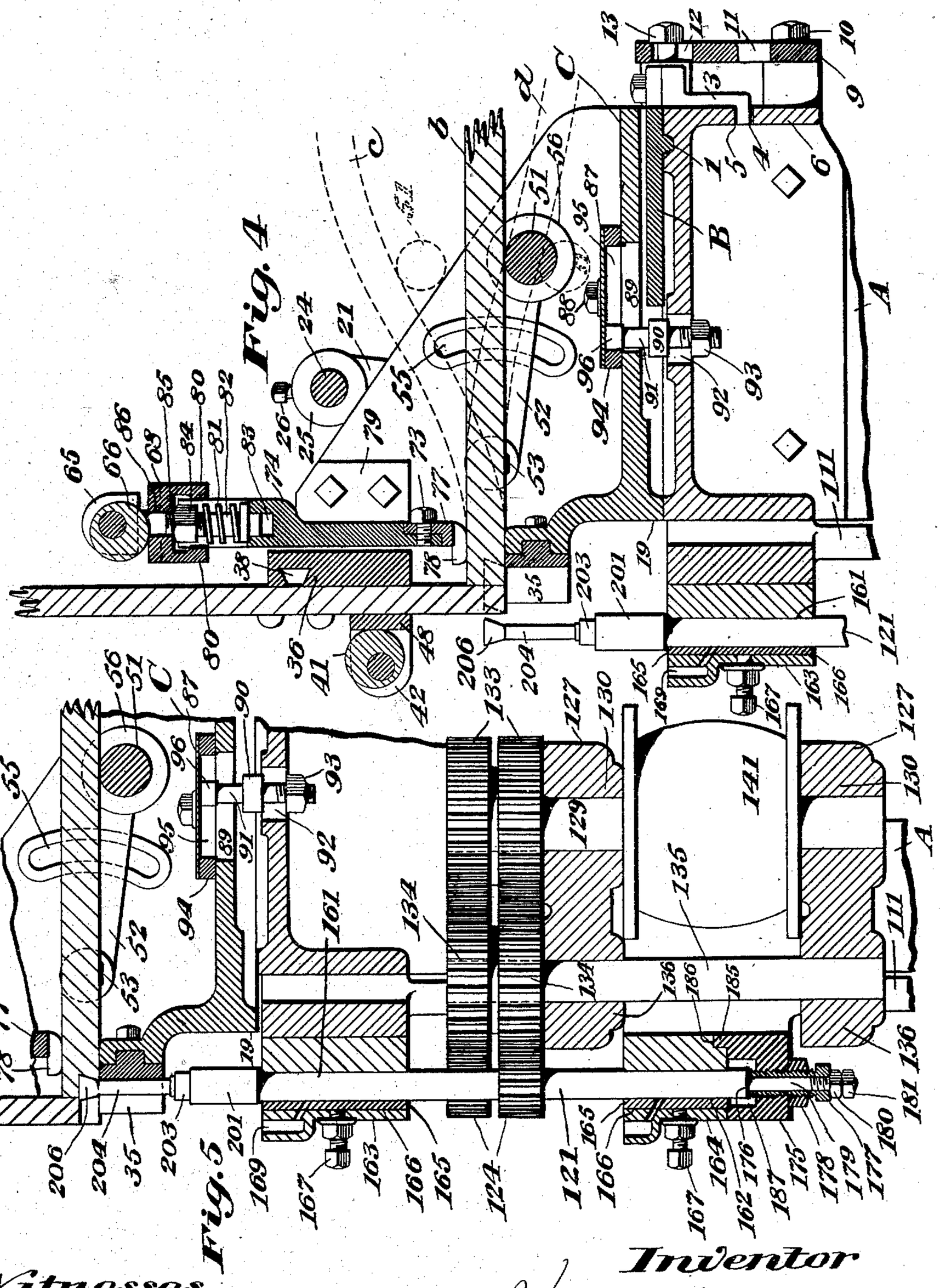


Fig. 4

Fig. 5

Witnesses

J. D. Thorne

H. F. Harden.

Inventor

Harry S. Spencer,

by A. D. Seabrook

his Attorney.

No. 749,458. PATENTED JAN. 12, 1904.

H. S. SPENCER.

DOVETAILING MACHINE.

APPLICATION FILED FEB. 27, 1902.

NO MODEL. 6 SHEETS—SHEET 5.

Fig. 6

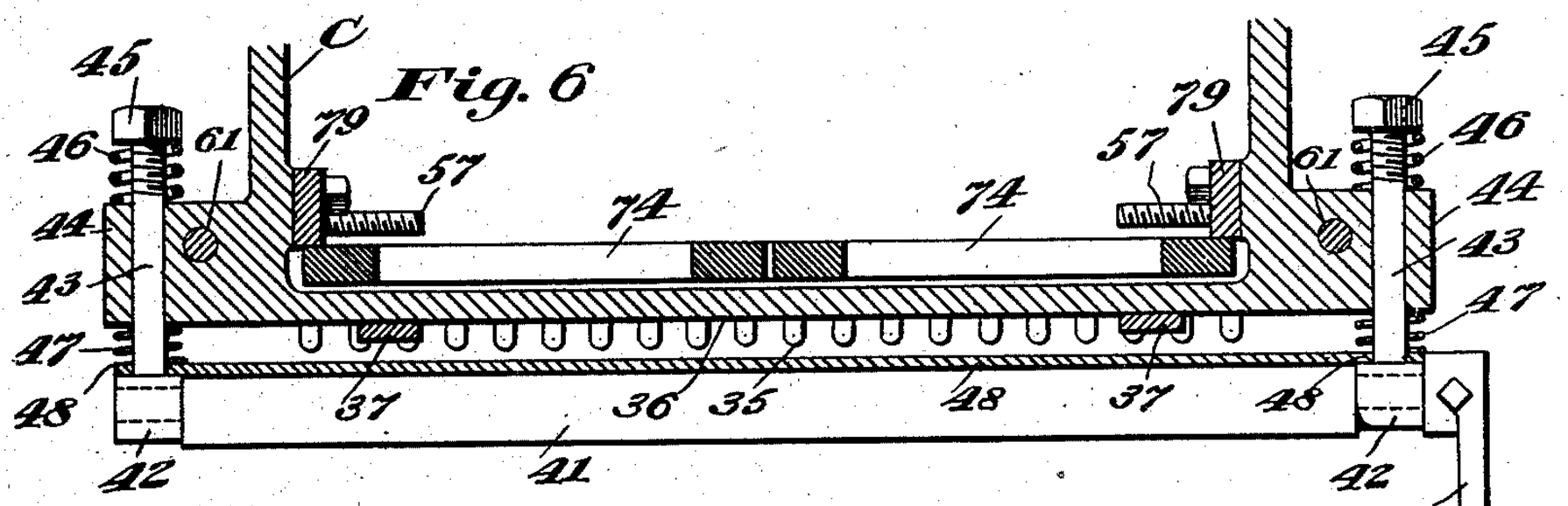


Fig. 7

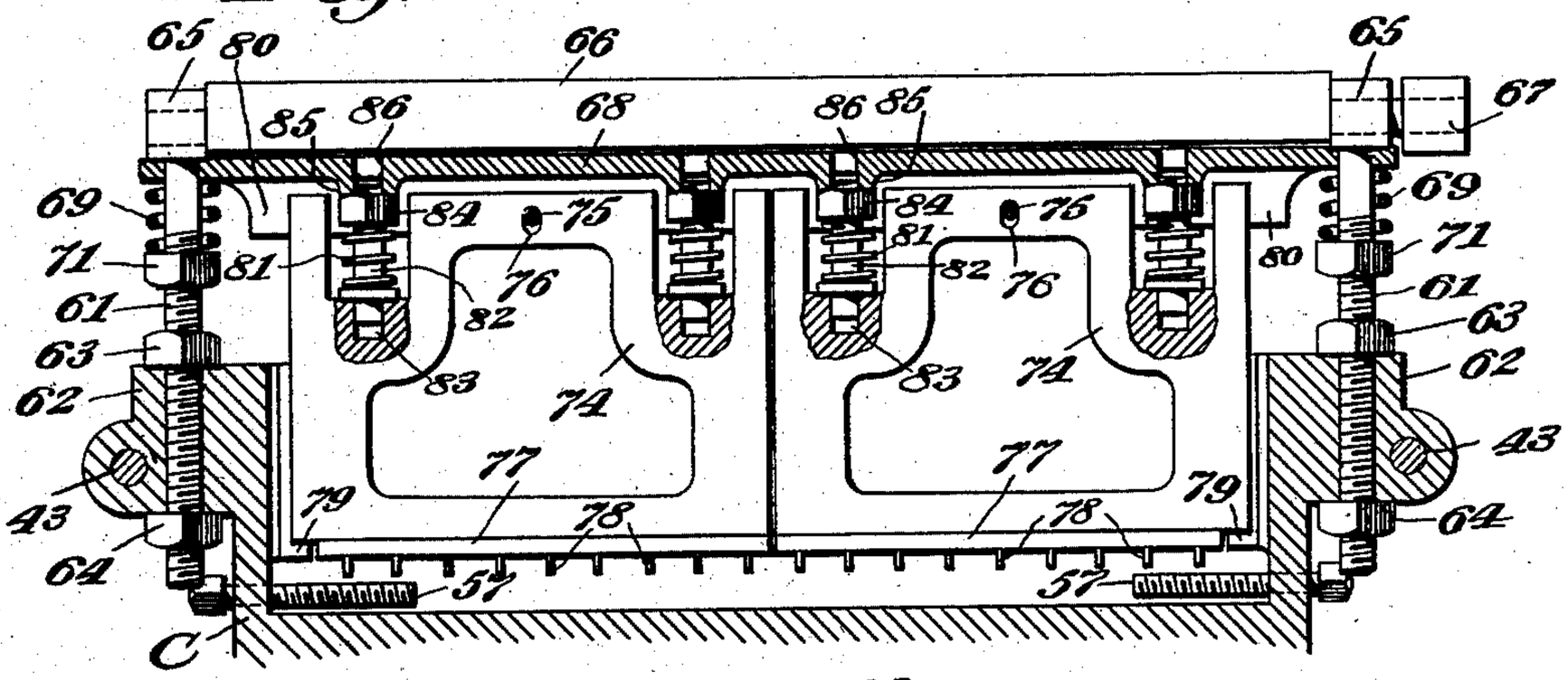


Fig. 13

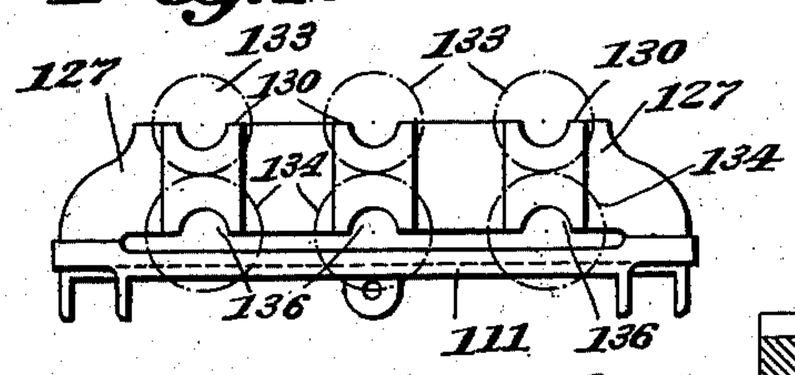
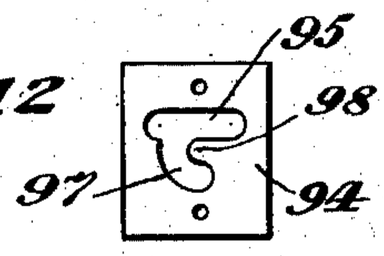


Fig. 12



Witnesses
L. B. Thorne
H. F. Harden

Fig. 10

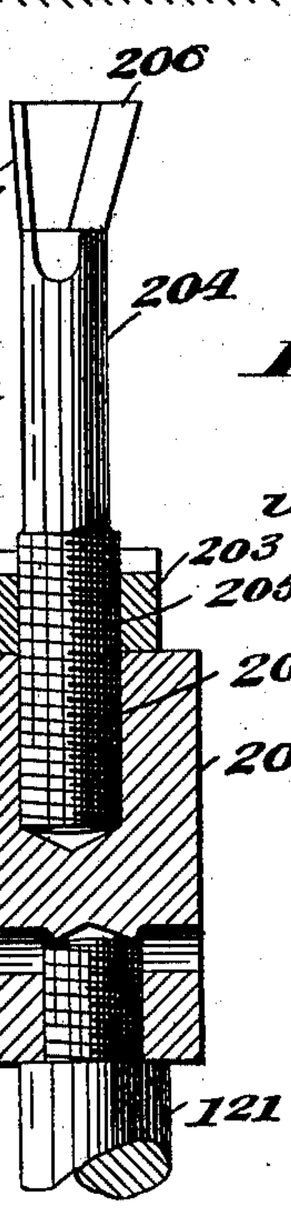
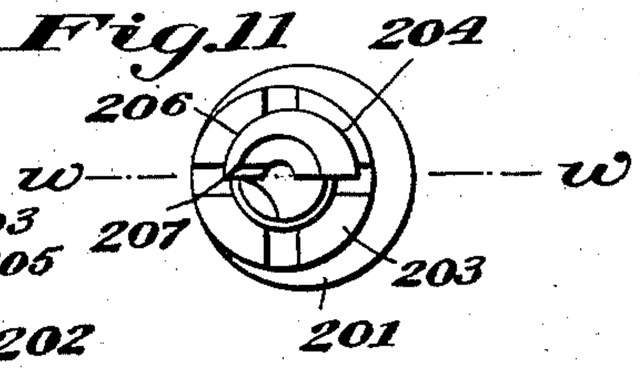


Fig. 11



Inventor
Harry S. Spencer,
by L. B. Thorne,
His Attorney.

No. 749,458. PATENTED JAN. 12, 1904.

H. S. SPENCER.

DOVETAILING MACHINE.

APPLICATION FILED FEB. 27, 1902.

NO MODEL. 6 SHEETS—SHEET 6.

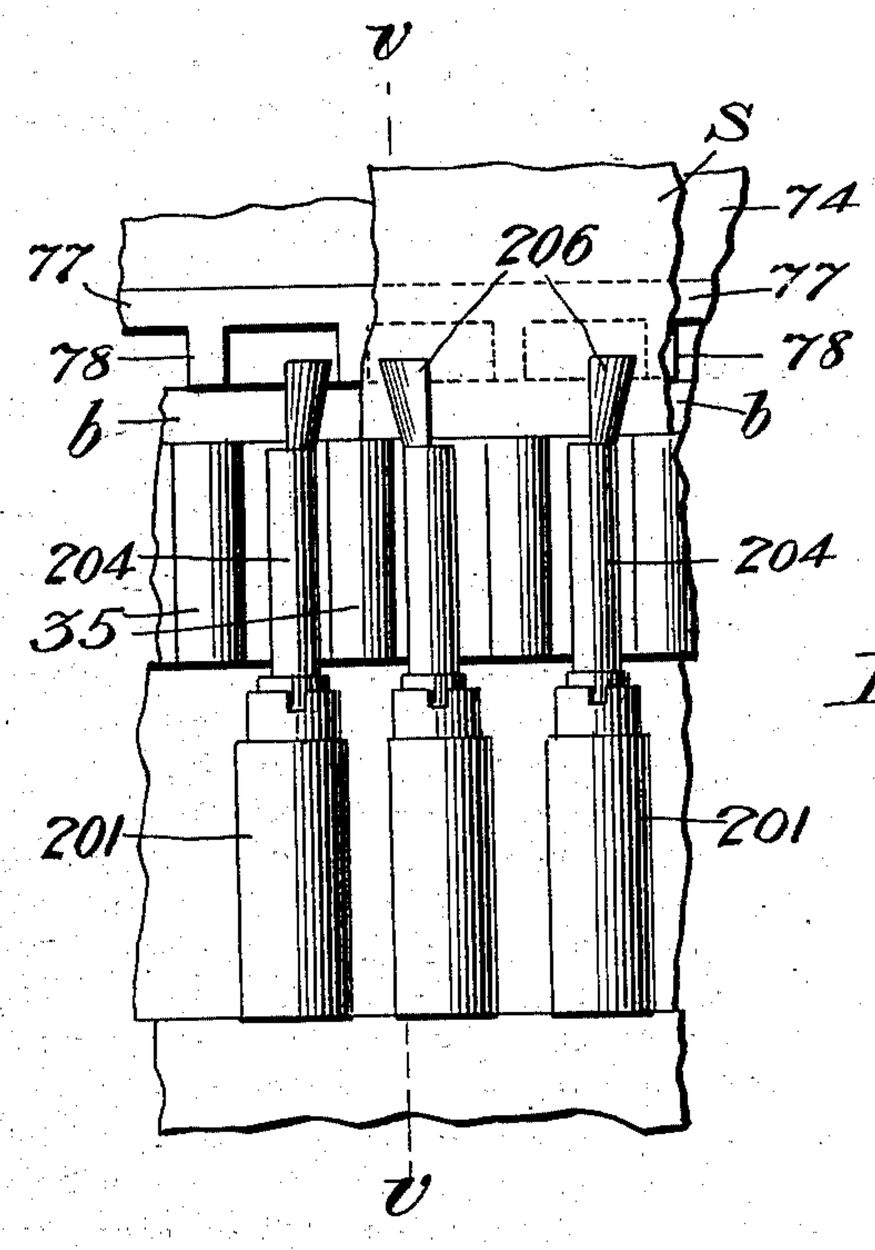


Fig. 14.

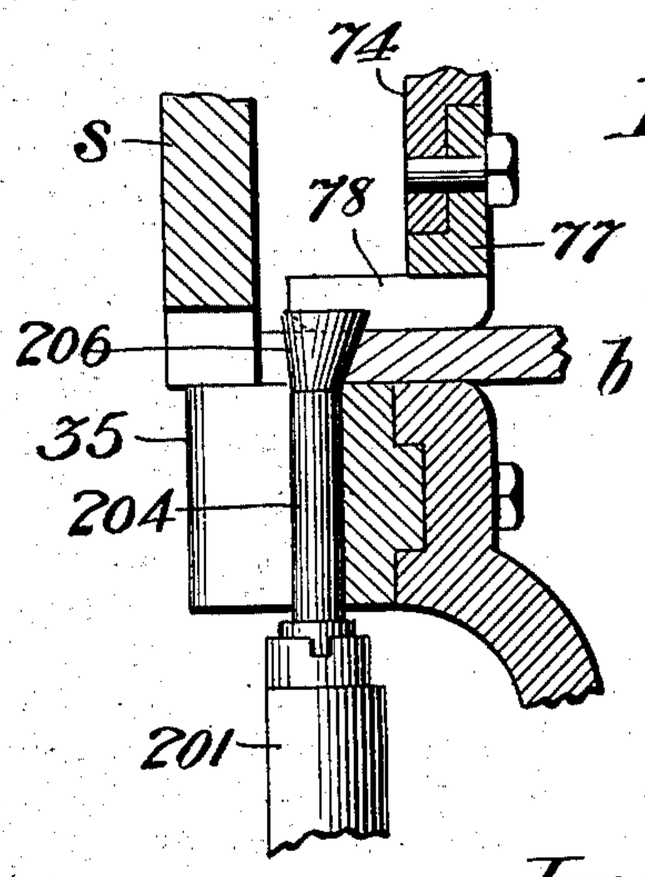


Fig. 15.

Witnesses:
Henry N. Bacon
Herbert F. Harden

Inventor:
Harry S. Spencer,
by D. L. Ackerson, His Attorney.

No. 749,458. Patented January 12, 1904.

UNITED STATES PATENT OFFICE.

HARRY S. SPENCER, OF BONDHILL, OHIO, ASSIGNOR TO J. A. FAY & EGAN COMPANY, OF CINCINNATI, OHIO, A CORPORATION OF WEST VIRGINIA.

DOVETAILING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 749,458, dated January 12, 1904.

Application filed February 27, 1902. Serial No. 95,878. (No model.)

To all whom it may concern:

Be it known that I, HARRY S. SPENCER, a citizen of the United States, residing at Bondhill, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Dovetailing-Machines, of which the following is a specification.

My invention relates particularly to that class of dovetailing-machines known as "gang" dovetailing-machines in which a plurality of cutters are adapted to simultaneously cut dovetails—for instance, for forming the union at the corner between the front and sides of a drawer—the spindles being preferably sufficient in number to form all the dovetails for one corner of the drawer at one operation.

The fronts of drawers in furniture are not only straight, but are also curved outwardly in some instances and curved inwardly in other instances, forming what are known as "swell-front" drawers.

My invention consists in providing a dovetail-machine with means for readily accommodating, supporting, and clamping a straight front or a swell front and side of a drawer in the machine, so that the side with a straight or swell front may be simultaneously dovetailed.

My invention consists, further, in providing a gang dovetailing-machine in which the cutting edges of the dovetail-cutters may all be maintained at a uniform eccentricity to the spindles for cutting the full circle of cut for forming close and uniform joints throughout the gang; further, in novel means for clamping the stock, novel driving mechanisms for the spindles, novel adjustments for taking up wear of the spindles, novel means for controlling movements of the stock-supporting table, and, further, in the parts and in the construction, arrangement, and combinations of parts hereinafter more fully described and claimed.

In the drawings, Figure 1 represents a front elevation of my improved machine. Fig. 2 is a side elevation of the same. Fig. 3 is a plan view of the same. Fig. 4 is a central longitudinal section on the line *z z* of Fig. 1, showing the upper part of the frame and the stock-supporting table and adjacent parts. Fig. 5 is a similar section on the same line, illustrating the driving mechanism and adjustments for the spindles. Fig. 6 is a horizontal section on the line *y y* of Fig. 2, illustrating details of the horizontal and upright clamping mechanisms. Fig. 7 is a vertical section taken on the line *x x* of Fig. 2, showing the upright clamping mechanism. Fig. 8 is a plan view of the table-support; and Fig. 9 is a front elevation of the same also showing the pattern-plate for the cutters, with cutters and adjacent parts shown in dotted lines to show relation of parts. Fig. 10 is a vertical section taken on the line *w w* of Fig. 11, showing the means for eccentrically mounting and securing the dovetail-bit with relation to the spindle. Fig. 11 is a plan view of the same, showing the eccentricity of the cutting edge of the cutter and the eccentric mounting of the cutter itself. Fig. 12 is a plan view of the slotted guide-plate, and Fig. 13 is a plan outline view of the spindle-frame. Fig. 14 is a detail in front elevation, showing the dovetail-cutters in position to take through the drawer-front, with the extensions on the pressure-foot arranged to take between adjacent cutters; and Fig. 15 is a detail of the same in section on the line *v v* of Fig. 14, but showing the stock moved up into the cutters.

A represents the frame.

B is a transversely-sliding support, and C a work-support or table slidable longitudinally on the support B. The support B slides transversely on the ways 1 2 and has a depending arm 3, with a finger 4 taking against the lower side of a ledge 5 in the cross-girth 6 for preventing raising of the support. The transverse movement of the support is effected by a lever 9, pivoted on a bolt 10 on the frame and having upturned end 11, provided with a slot 12, through which a bolt 13 takes into the support. A spring 14 takes between the lever and frame and exerts downward pressure on the lever, the pressure being preferably adjustable, as by a turnbuckle 15. The table C slides on ways 17 in the support. The support B is preferably of the form shown in

Fig. 8, having a gap 18 at its front, a rib 19 from the table taking into the gap. A rock-lever 21 is pivoted on a bolt 22, supported on a post 23, secured to each side of the support B. The rock-levers are connected by a shaft 24, taking through hubs 25 at the upper ends of the rock-levers, with bolts 26 for firmly securing the shaft and rock-levers together. An operating-lever 29 is secured to the shaft 24. The lower end of the rock-levers at each side connects to the table C by a link 31. As the operating-lever 29 is thrown forwardly or backwardly it swings the rock-levers upon their pivots 22 and through the medium of the links 31 forces the stock supported on the table backward or forward into the cut.

In operation the side of the drawer (shown at *s*) is placed vertically upon the table with the end which is to receive the dovetail tenons resting upon a comb 35, with the side of the piece of stock resting against a rear support 36, having side gages 37 for the edge of the stock slidable in a groove 38 in the rear support. The upright piece of stock is clamped against the rear support by means of an eccentric roll 41, mounted eccentrically at each end in a bearing 42 on a rod 43, slidable lengthwise in a bearing 44 of the table-frame. The outer end of the rod has a nut 45, with a comparatively strong spring of limited extension 46 between the bearing 44 and nut 45. A spring 47 weaker in tension and less limited in extension takes between the bearing 44 and a plate 48, adapted for normally pressing the rods 43, roll 41, and plate 48 forwardly for permitting ready insertion and removal of the stock. The plate 48 is preferably supported at each end upon the rods 43 and takes between the eccentric roll 41 and the stock and serves the purpose of receiving the direct thrust of the eccentric roll and while communicating its pressing action to the stock prevents sliding contact of the eccentric roll with the stock and the consequent marring of the stock. The nuts 45 are adjusted upon the rods 43 for thickness of stock, and the springs 46 being limited in extension and strong in tension permit the forward movement of the eccentric roll and plate for the ready removal and insertion of the stock, while acting as a yielding cushion to prevent undue pressure upon the stock. The eccentric roll 41 is operated by a lever 49.

The front of the drawer if straight is placed with its end upon the comb 35 to rear of the upwardly-extending side already placed upon the comb, as described, and is also supported by rear agency in horizontal plane with the comb; but if it be a swell front the rear supporting agency is adjusted to position out of horizontal plane with the comb for accommodating the contour of the front and supporting the same in proper relation to the line of cut and side piece. Thus in Fig. 4 I have shown a straight front at *b*, an outwardly-extending swell front at *c*, and an inwardly-extending swell front at *d*, and a rear support 51 for the various fronts in different elevations for supporting each front in operative position for its cut. I have shown this rear support in the form of a roll or bar supported at either end on an arm 52, pivoted in the table-frame on a bolt 53 between said support 51 and the comb 35 and having a bolt 54 taking into the arm and through a slot 55 at each end of the table-frame for securing the support in adjusted position. Locating the pivot for the rear support between the rear support and cutters causes the rear support when swung out of horizontal plane with the comb to move in an arc toward the vertical plane of the cutters. The greater the movement of the rear support out of horizontal plane with the comb the closer will be its approach to the vertical plane of the cutters, thereby affording exceptional compactness of parts and permitting swell fronts with very abrupt swells at their ends to be supported by both the comb and rear support. The rear support is adapted to be adjusted to various elevations above and below the horizontal plane of the comb and into horizontal plane with the comb to accommodate the various classes of stock to be cut and secured in position by means of the bolts 54. It will also be noted that in my improved construction free space is provided between the supports and below the rear support (the front support forming a ledge and the rear support a bar) for permitting the drawer-front to be supported solely by the front support and the rear support, thereby permitting the rear support to support the drawer-front when the rear support is below as well as above the horizontal plane of the comb. Collars 56 are adapted to be slid on and secured to the support 51 in various positions and act as side gages for the stock. Bolts 57, screwing into the table-frame, also serve as side gages. In my improved construction the same support serves for straight and inwardly and outwardly extending swell fronts.

After the fronts are placed in position they are clamped by means of the following agencies: At each end of the table-frame there is an upright post 61, adjustable in a bearing 62 by means of nuts 63 64. The upper end of each post has a bearing 65 for an eccentric roll 66, carrying an operating-lever 67. A yoke 68 spans the table from post to post and is located below and adapted to be depressed by the eccentric roll. Springs 69 surround the posts, with nuts 71 screwing on the posts for adjusting the tension of the springs, the springs normally raising the yoke and parts supported thereby. A slide or slides 74 are supported from the yoke by pins 75 taking through slots 76 in the yoke. The slide 74 carries a clamping-foot 77 for the front piece of the stock, which clamping-foot is preferably

detachable, as by bolts 73 taking through the foot into the slides. Springs 81 take about posts 82, extending into sockets 83 in the slide 74, with the springs exerting expanding pressure between the slide and nuts 84 on the posts, the nuts being adjustable on the posts. Lugs 85 on the yoke take against the nuts, and when the eccentric roll 66 is turned for exerting pressure on the yoke such pressure is communicated to the slide and the clamping-foot 77 through the lugs 85, nuts 84, and springs 81, the posts 82 being adapted to slide in the sockets 83, with the upper end of the posts projecting into apertures 86 in the yoke if the nuts are adjusted sufficiently low upon the posts so that the posts extend above the nuts. The springs 81 serve as a cushion for the pressure upon the stock, and the pins 75 and springs 69 serve to raise the slide and yoke when the pressure of the eccentric roll is released.

The slides 74 are held in place between the rear wall of the rear support 36 and blocks 79, secured at each end of the table-frame, and the yoke 68 has depending flanges 80 for forming front and rear guides for the slides, with preferably a loose fit. There are preferably a plurality of these slides side by side, preferably with play between the same, so that a plurality of pieces of stock may be placed side by side and each piece held in place with sufficient pressure even if the pieces are of different thicknesses or so that all parts of a wide piece of stock of varying thickness may be subjected to pressure, the slides being loosely mounted to accommodate themselves readily to different or varying thicknesses of stock.

As above stated, the clamping-foot 77 may be made removable, the object of which is to permit clamping-feet of various contours to be inserted, depending on the contour of the stock to be pressed or the comparative thickness of stock and depth of cut. The clamping-foot may have ribs 78 taking between the longitudinal planes of adjacent cutters and into the horizontal plane of the cutters when it is intended to have the cutters pass entirely through the horizontally-disposed stock for affording clearance for the cutters. (See Figs. 14 and 15.) When a swell front having an abrupt swell at its end is being cut, a clamping-foot having a corresponding curve at its rear face may be employed, and feet to correspond to other shapes of fronts may be substituted.

It is one of the objects of my invention to provide simple and effective means for rounding off the inner edge of the dovetail tenon to correspond with the inner end of the dovetail groove. I provide the frame with an upwardly-extending pin 91, adjustable longitudinally of the movement of the table toward the cutters in a slot 92. A nut 93 with a rigid collar 90 on the pin serves to hold the pin in rigid position after adjustment. A plate 94 is rigidly secured to the table C by bolts 88. This plate has a longitudinal slot 95 sufficiently long for extreme limits of movements of the table, into which slot the pin 91 is adapted to take through the gap 18 in the support and a clearance-opening 89 in the table-frame, a roll 96 at the upper end of the pin taking against the sides of the slot. A curved slot 97 extends from the slot 95, with a curved tongue 98 projecting between the slots. The curvature of the tongue corresponds with the curvature it is desired to give to the inner ends of the dovetail tongues. The curved tongue by the manipulation of the levers 9 and 29 operating on the support and table-frame is guided about the pin, and thereby carries the stock about the cutters in a similar curve, rounding off the inner ends of the dovetail tongues of the drawer sides. Bolts 99, adjustable on the support, are adapted to strike stops 100 on the table for adjustably limiting the forward movement of the table and the consequent longitudinal depth of cut. A dust-plate 87 takes above the slotted plate.

In operation the stock supported by the table is forced forwardly into the cutters by means of the operating-lever 29, the plate 94 sliding upon the roll 96 of the upright pin 91, the table being caused to move longitudinally by the guidance of the sides of the slot upon the roller, pressure of the spring 14 on the operating-lever 9 causing the unbroken straight face of the slot to impinge upon the roller. The longitudinal movement of the table is limited by the bolts 99 and the stops 100. The table is then receded. When rounding off the inner edges of the dovetail tongues, the curved tongue 98 is caused to follow the roller on the pin in receding the table by bringing upward pressure to bear on the operating-lever 9, thereby causing the curved tongue 98 to be guided in its movement by the roller on the pin and moving it in this curve around the pin, and thereby determining the line of cut of the outer edge of the stock. The table and support are next moved in the reverse direction to bring the straight slot again in line with the pin and the table moved rearwardly for bringing the table and stock out of line with and free from the cutters, the pin being always retained in said slots. The tendency in raising the lever 29 is to throw the outer curved face of the curved slot forcibly against the roll of the pin, the spring 14, however, cushioning this movement. The spring 14 also maintains the inner face of the curved tongue—*i. e.*, the face nearest the straight slot—against the roll, and in the return movement of the curved slot urges the said inner face of the curved slot against the roll of the pin and the straight slot into line with the pin.

A spindle-frame 111 is adjustable on the main frame by means of a screw and hand-wheel 112. Bolts 113 taking into the main

frame through slots 114 in the spindle-frame serve to clamp the two frames in rigid relation. Series of spindles 121 are suitably journaled in the spindle-frame. There may be any desired number of spindles or series of spindles, depending upon the number of dovetails to be cut or the width of stock. For convenience, especially in driving a number of spindles, I have illustrated the spindles as divided into series or nests of five, the spindles of each series being interconnected for driving by pinions 124. The spindle-frame 111 has rearward extensions 127. There is an upright shaft 129, journaled in bearings 130 in each rearward extension, supporting at its upper end a gear 133, which meshes with a transmitting-gear 134, mounted on a shaft 135, journaled in bearings 136 in the extension and in turn meshing with one of the series of pinions 124. It will be noted that the driving-gear, transmitting-gear, and pinions for the outer series of spindles are at a different elevation from the middle series for convenience and ease in driving and compactness of parts and that the spindles and their driving mechanism are all mounted on the spindle-frame for simultaneous adjustment. Each of the upright shafts 129 carries a pulley 141, which receives motion through a belt from a pulley 142 on a counter-shaft 143, to which power is transmitted in suitable manner, as by means of tight and loose pulleys 144. A belt-tightener 151 is pivotally mounted on the frame of the machine, as on bolts 152, and consists, preferably, of a frame 153, supporting a shaft 154, on which pulleys 155 are loosely mounted between the pulleys on the counter-shaft and the pulleys 141, with a weight 156, supported on the outer end of the frame 153. The belt-tightener serves the purpose of conveniently tightening the belts for the several series of spindles, and its construction enables the ready release of the belt for adjustment of the spindles and cutters, as will be hereinafter explained.

I prefer to mount the spindles in upper and lower straight bearings 161 162, bored, respectively in cross-girths 163 164, firmly secured to the spindle-frame. The front parts of the bearings are composed of blocks 165, inserted in openings 166 in the cross-girths, with bolts 167 screwing into the front of the cross-girths, with the ends taking against the blocks for adjusting the blocks with relation to the spindles for forming a snug bearing about the journal of the spindle and taking up wear. I place these adjusting-blocks in the front of the spindles, because the front of the bearings receive the greatest strain and are subjected to the greatest wear because of the spindles being obliged to resist the forward thrust of the stock when the latter is moved into the cut. An oil-channel 169 is provided in the cross-girth and may be filled with suitable absorbent material, suitable oil-holes communicating with the spindle-journals.

A cross-girth 175 is provided for the spindle-frame for receiving the steps for the spindles. Each of the spindles has an offset 176 near its lower end for resting on a hollow bolt 177, screwing into the cross-girth 175, with a jam-nut 178 for securing the bolt in adjusted position. The hollow bolt, which is preferably of bronze, thereby forms a step for the spindle. A reduced extension 179 of the spindle projects through the hollow bolt and is screw-threaded at its end for receiving an adjusting-nut 180 and a jam-nut 181. The inverted frusto-conical cutters employed have a tendency to raise the spindles as soon as the stock is forced against the cutters, and constructing my machine with the peculiar step-bearing described affords an exceptionally simple and effective means for counteracting the raising tendency of the cutters, and providing straight bearings and journals for the spindles affords an exceptionally economical construction where a large number of spindles are employed in a machine of the character described. The reduced extension preferably turns loosely in the hollow bolt. The cross-girth 175 preferably has an upwardly-extending lip 185, taking into a rabbet 186 of the cross-girth 164 for preventing slinging of the oil against the belts. The cross-girth 175 has an oil-reservoir 187, the lower ends of the spindles proper and upper ends of the step-bolts projecting into the oil-reservoir for being continuously supplied with oil therefrom. The oil-reservoir 187 is fed from the oil-reservoir in the cross-girth immediately above. A suitable drip-pan may be placed below the cross-girth 175 about the lower ends of the spindles.

I provide means whereby all the cutters of the gang dovetailing-machine may be set for cutting dovetails of uniform width and the width of cut maintained irrespective of sharpening the cutters, the sharpening causing change in the circle of cut and irrespective of whether new cutters and worn cutters are employed in the same gang, thus providing a gang dovetailing-machine wherein new and old cutters may be simultaneously used in the same gang and the same circle of cut maintained for all cutters, making close joints for the product at all times. In practice it is desirable to place the spindles of a gang very close together. My improved construction permits this also to be done. By referring to Fig. 1 it will be noticed that the cutting edges of the dovetail-cutters project alternately to right and left and that the dovetail spindles are directly intergeared by means of spur-gearing, driving the cutters alternately simultaneously in right and left directions, making a very compact construction and with the means employed for adjusting and securing the dove-

tail-cutters to the spindles permitting the spindles to be brought very close together and ready adjustment of the individual cutters in the gang. The upper ends of the spindles carry chucks 201, which are preferably concentrically screw-threaded to the spindles in suitable manner, forming a continuation of the spindle. The upper ends of the chucks have an eccentrically-screw-threaded hole 202. The lower end or shank of the cutter 204 is also screw-threaded, as at 205, and screws into the hole 202, so as to position the cutter eccentrically to the spindle as well as to approximate height thereon. The cutter has a cutting-wing 206 eccentric to the cutter-shank. The cutting edge 207 of the cutter is normally at the point of least eccentricity to the cutter-shank, the periphery of the wing gradually receding radially from the longitudinal axis of the cutter-shank to a point of greater eccentricity thereto. The cutting edge is also normally at a given distance when set from the longitudinal axis of the spindle to perform a cut of given width. In sharpening the cutter the wing is gradually filed away from its inner side, thereby bringing the cutting edge gradually radially nearer the longitudinal axis of the spindle. As the cutter is thus filed away the circle of swing of the cutter gradually becomes less, and to partly compensate for this and save changes of the cutter on the spindle the periphery of the cutting-wing is made of gradually-increasing eccentricity to the cutter-shank for causing the periphery of the cutter-wing to be more nearly concentric with the periphery of the spindle than if this gradually-increasing eccentricity of the cutter-wing were absent, while still permitting the periphery of the cutter-wing to be sufficiently eccentric to the periphery of the spindle to provide clearance for the cutter. As the cutter is turned in its screw-threaded bearing in the chuck its cutting edge is brought back to its original distance from the longitudinal axis of the spindle. In order to bring the cutter after sharpening to its original circle of cut, the clamping-nut 203 is loosened and the cutter turned in its eccentric mounting on the spindle until the cutting edge has resumed its original position for making the full circle of swing of the cut, when the clamping-nut is again clamped. By means of my improved device, therefore, all the cutters of the gang dovetailing-machine may be maintained with their full circle of swing irrespective of the amount of sharpening to which particular cutters have been subjected, and it enables me to replace any particular cutter of any series with a new cutter and to use new cutters and also cutters which have been very nearly worn out in the same gang, all making the same circle of cut. The threaded connection of the cutter-shank with the spindle also permits the cutter to be raised on the spindle, so as to project a greater distance therefrom, while maintaining the cutting edge at practically its original position with relation to the longitudinal axis of the spindle by giving the cutter, for instance, a full turn in its threaded connection with the spindle. By means of the hollow bolt or bushing 177 I am also enabled to separately adjust each cutter to vertical position, and by means of the hand-screw 112 I am enabled to adjust all the cutters vertically, thereby enabling me to adjust each cutter separately for uniformity of cut and all cutters separately or collectively for depth of cut.

If it is desired to adjust the cutters to position, either after new cutters have been inserted in the spindles or after sharpening, the weighted end of the belt-tightener is raised and blocked, which releases the tension of the driving-belts and permits the spindles to be readily turned by hand. A pattern-plate 212 is placed upon the comb, which pattern-plate has a series of openings 183 for giving the circle and depth of cut to be made by each and all the cutters. After the pattern-plate has been placed above the cutters the cutters are adjusted to approximate position vertically on their spindles, so that the upper edges of the cutters will approximately meet the upper ends of the openings 183 by screwing the cutters with relation to the spindles or by adjustment of the hollow step-bolt. After this vertical adjustment is made the adjustment for circle of cut is made by turning any cutter which does not make its proper circle of cut in its eccentric mounting on the spindle until its cutting edge meets the side walls of the opening 183 for determining the circle of cut, when the jam-nut 181 is tightened by suitable spanner-wrench and the adjustment of other cutters made in similar manner. The adjustment to definite height may be made by the hollow step-bolt or bushing. When these adjustments have been made, all the cutters will cut to uniform height and uniform circle of cut. The cutters may then be collectively adjusted for depth of cut by vertically adjusting the entire spindle-frame by means of the hand-screw and wheel 112.

I claim—

1. In a dovetailing-machine, the combination of a spindle, a dovetail-cutter eccentrically mounted with relation thereto, said cutter having a cutting-wing whose periphery is eccentric to the longitudinal axis of said cutter, the cutting edge of said wing being at the point of least eccentricity in said wing.

2. In a gang dovetailing-machine, the combination of a gang of spindles, dovetail-cutters therefor eccentrically mounted with relation to the respective spindles, said cutters having respectively a cutting-wing whose periphery is eccentric to the longitudinal axis of said cutter, the cutting edge of said wing being at the point of least eccentricity in said wing.

3. In a dovetailing-machine, the combination of a spindle and a dovetail-cutter therefor eccentrically mounted with relation thereto, said dovetail-cutter comprising a cutting-wing and shank, said cutting-wing having its periphery eccentric to the longitudinal axis of said shank, the cutting edge of said wing being at the point of least eccentricity in said wing, and said shank having threaded connection with relation to the spindle and a lock-nut therefor whereby the degree of projection of the bit from the spindle is adjusted.

4. In a gang dovetailing-machine, the combination of a gang of spindles, dovetail-cutters therefor eccentrically mounted with relation to the respective spindles, said dovetail-cutters comprising respectively a cutting-wing and shank, said cutting-wing having its periphery eccentric to the longitudinal axis of said shank, the cutting edge of said wing being at the point of least eccentricity in said wing, and said shank having threaded connection with relation to the spindle and a lock-nut therefor whereby the degree of projection of the bit from the spindle is adjusted and whereby said cutters are brought to uniform depth and circle of cut.

5. In a gang dovetailing-machine, the combination of the main frame, a gang of dovetail spindles, dovetail-cutters therefor screw-threaded eccentrically with relation to the respective spindles, said cutters having respectively a cutting-wing whose periphery is eccentric to the longitudinal axis of said cutters, the cutting edge of said wing being at the point of least eccentricity in said wing, a supplemental frame in which said spindles are mounted, means for adjusting each spindle separately longitudinally on said supplemental frame, and means for adjusting said supplemental frame on the main frame for adjusting said spindles collectively.

6. In a gang dovetailing-machine, the combination of a gang of spindles, dovetail-cutters, therefor eccentrically mounted with relation to the respective spindles, said cutters having respectively a cutting-wing whose periphery is eccentric to the longitudinal axis of said cutter, the cutting edge of said wing being at the point of least eccentricity in said wing, spur-gearing directly connecting adjacent spindles and revolving the spindles alternately to right and left, the dovetail-cutters on said spindles being alternately right and left hand cutters to correspond with the rotation of said spindles, substantially as described.

7. In a dovetailing-machine, the combination with the spindle and a pair of work-supports, the first of said work-supports being adjacent to the spindle and the second farther removed therefrom, with free space to all sides radially of said second support and between said pair of supports for permitting said pair of supports to form the only supports for the stock, and means for positioning said second support in plane with the supporting-surface of said first support and to both sides of said plane, substantially as described.

8. In a dovetailing-machine, the combination with a spindle, of a ledge adjacent to the spindle, a bar, there being free space to all sides radially of said bar and between said bar and ledge, and means for permitting adjustment of said bar up and down whereby said ledge and bar are arranged to form the only supports for straight drawer-fronts as well as inwardly and outwardly extending swell drawer-fronts, and clamping means for the drawer-front, substantially as described.

9. In a gang dovetailing-machine, the combination of a gang of dovetail spindles, a ledge adjacent to said gang, a bar to rear of said ledge, there being free space to all sides radially of said bar and between said bar and ledge, means for permitting adjustment of said bar up and down above and below the horizontal plane of the supporting-surface of said ledge, and means for clamping the stock in place, whereby the ledge and bar are arranged to form the only supports for straight drawer-fronts as well as inwardly and outwardly extending swell drawer-fronts, substantially as described.

10. In a dovetailing-machine the combination with a dovetail spindle, of a support adjacent to the spindle, a bar, arms extending from said bar and having pivots between said bar and spindle, whereby said bar when swung on said pivots out of horizontal plane with said first-named support moves toward the longitudinal axis of said spindle with free space to all sides radially of said bar and between said bar and first-named support whereby the stock is supported only by said first-named support and said bar, substantially as described.

11. In a gang dovetailing-machine, the combination with the frame and table, of a gang of dovetail spindles mounted on the frame, means on the table for supporting a drawer side, means on the table for normally supporting a drawer-front at substantially right angles thereto, said latter means comprising in combination a ledge adjacent to said spindles, a bar to rear of said ledge, there being free space to all sides radially of said bar and between said bar and ledge, arms extending from said bar and pivoted to said table between said bar and spindles and means for permitting said bar to be adjusted to positions above and below the horizontal plane of the supporting-surface of said ledge whereby said bar when swung out of horizontal plane with the supporting-surface of said ledge moves toward the longitudinal plane of said spindles, and constructed and arranged for supporting the drawer-front only upon said ledge and bar, substantially as described.

12. In a dovetailing-machine, the combination of a work-support, means for pressing the

stock against the support, rods therefor slidably arranged, a spring of greater tension and less extension acting as a cushion for the stock, and a spring of less tension and greater extension acting as a means for retracting the stock-pressing means.

13. In a dovetailing-machine, the combination of a work-support, an eccentrically-mounted roll, a plate between the roll and the work-support, rods extending from the roll to rear of the work-support, a spring between the plate and work-support, and a spring between the work-support and the outer end of the rod.

14. In a dovetailing-machine, the combination with the main frame and work-supporting table movable thereon, upwardly-extending guideways in the table, an upwardly-extending clamping-bar loosely hung in the ways for permitting tilting thereof, means for depressing the clamping-bar, and cushion between said latter means and the clamping-bar.

15. In a dovetailing-machine, the combination of a work-support, a yoke, a cushion between the yoke and work-support, a clamping-bar, means between the yoke and clamping-bar for supporting the clamping-bar, a cushion between the clamping-bar and yoke, and means for depressing the yoke and thereby depressing the clamping-bar.

16. In a dovetailing-machine, the combination with the main frame and a work-supporting table movable thereon, vertically-reciprocating yoke supported from the table and movable therewith, guideways extending up and down on the table, a plurality of clamping-bars extending up and down in the ways and hung from the yoke, a cushion between each of the clamping-bars and the yoke with play between the clamping-bars and between the clamping-bars and the ways, and means for depressing the yoke and thereby depressing the clamping-bars, with the play between the bars and ways permitting tilting of the clamping-bars for accommodating inequality of stock.

17. In a dovetailing-machine, the combination of a series of cutter-spindles with cutters therefor, a work-support, a clamping-bar, with a series of projections on the clamping-bar arranged to project between the longitudinal planes of the spindles for taking against the stock and forming clearance for the cutters between the projections.

18. In a gang dovetailing-machine employing inverted frusto-conical dovetail-cutters, the combination of a frame, a gang of spindles, an inverted frusto-conical dovetail-cutter for each, a bushing at the end of each of said spindles, each of said spindles having a shoulder resting on its bushing and an extension projecting through said bushing, adjusting means between said extension and bushing on said respective spindles for taking up longitudinal movement of said extension in said bushing, and means for adjusting said respective bushings independently with relation to the frame, whereby said spindles are respectively adjusted independently with relation to the frame and the movement of the respective spindles toward the respective inverted frusto-conical dovetail-cutters thereon is limited.

19. In a gang dovetailing-machine employing inverted frusto-conical dovetail-cutters, the combination of a main frame, a supplemental frame, means for adjusting the supplemental frame with relation to the main frame, a gang of spindles journaled in the supplemental frame, and inverted frusto-conical dovetail-cutter at one end and a bushing at the other end of each of said spindles, means for adjusting said respective bushings independently with relation to said supplemental frame, each of said spindles having a shoulder taking against its said bushing and an extension projecting through said bushing, nuts taking against said respective bushings and adjustable on said respective extensions, whereby longitudinal movement of the spindles is limited and the tendency of longitudinal movement of said inverted frusto-conical dovetail cutters and spindles toward the stock when cutting into the stock is counteracted.

20. In a dovetailing-machine, the combination of a spindle-frame, cross-girths therefor, with a gang of straight parallel bearings for the cross-girths, an additional cross-girth for the spindle-frame, a shoulder on each spindle, and a bolt for each spindle taking through the additional cross-girth against the shoulder for supporting the spindle, with an oil-channel in the additional cross-girth extending throughout the series of spindles, into which oil-channel the shoulders and ends of the bolts therefor project.

21. In a dovetailing-machine, the combination of a series of spindles with a series of dovetail-cutters therefor, eccentric screw-threaded securing means for each spindle, engaging screw-threaded means for the cutters for the latter and arranged to turn therein, a cutting edge for each cutter and a pattern-plate having an opening for each cutter and gaging-wall for each opening for determining the correct position of the cutting edges of the cutters.

22. In a dovetailing-machine, the combination of a series of spindles with a series of dovetail-cutters therefor, eccentric screw-threaded securing means for each spindle, engaging screw-threaded means for each cutter for the latter and arranged to turn therein, a cutting edge for each cutter, and a pattern-plate having an opening for each cutter and tapering wall for each opening for determining the correct position of the cutting edge of

the cutter, an upper face for each opening, and means for raising each spindle separately for determining the circle of cut and height of each cutter.

23. In a dovetailing-machine, the combination of a series of spindles, with dovetail-cutters therefor, an eccentric cutting edge for each cutter, means for eccentrically adjusting each cutting edge with relation to its spindle, means for independently and collectively raising and lowering the cutter, and a pattern-plate having an opening for each cutter, a tapering wall for each opening for giving the correct position for the cutting edge of each cutter, an upper face for each opening for giving the correct depth for each cutter, constructed and arranged for adjusting all the cutters to uniform height and circle of cut.

24. In a dovetailing-machine, the combination with a spindle, of a ledge adjacent to the spindle, a bar in rear of said ledge, there being free space to all sides radially of said bar, and between said bar and ledge, and means for permitting adjustment of said bar up and down, whereby straight fronts as well as inwardly and outwardly extending swell fronts are supported only on said ledge and bar, and a clamping-bar having a removable foot for clamping the stock on the ledge, substantially as described.

25. In a dovetailing-machine, the combination with a plurality of spindles and a table for the stock, of a clamping-bar for securing the stock on the table and projections on the clamping-bar between the longitudinal planes of the spindles for taking against the stock.

26. In a dovetailing-machine, the combination with the main frame, a gang of dovetail spindles and a work-supporting table, of a clamping-bar on the table, removable foot therefor, and extensions on the foot taking between the longitudinal planes of the spindles for clamping the stock securely to the table.

27. In a dovetailing-machine, the combination with the main frame and a reciprocating work-supporting table thereon, with posts extending upwardly from the work-support, means for adjusting the same with relation to the work-support, a yoke sliding up and down on the posts, an eccentric roll above the same, guideways extending up and down on the table, a series of clamping-plates mounted with play in the ways for the plates and play between themselves, cushion between the clamping-plates and the yoke, and means for suspending the plates from the yoke, constructed and arranged for permitting the clamping-plates to tilt sidewardly for accommodating variations in thickness of stock.

28. The combination in a dovetailing-machine, with the main frame and a sliding work-support table thereon, of the posts 61 vertically adjustable in the table, the yoke 68 on the posts, clamping-plates 74 suspended from the yoke, with a cushion between the plates and yoke, the spring 69 between the yoke and posts, and roll 66 mounted eccentrically in the upper ends of the posts, substantially as described.

29. In a dovetailing-machine, the combination with the main frame and a reciprocating work-supporting table thereon, of a vertically-movable yoke, springs between the yoke and table for urging the yoke upwardly, a clamping-plate suspended from the yoke, a cushion and sliding connection between the yoke and clamping-plate, and a roll eccentrically mounted for compressing the springs and cushion.

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

HARRY S. SPENCER.

Witnesses:
J. CASSIDY GRIMES,
PHILIP W. TOZZER.