J. L. CLAUDIN.

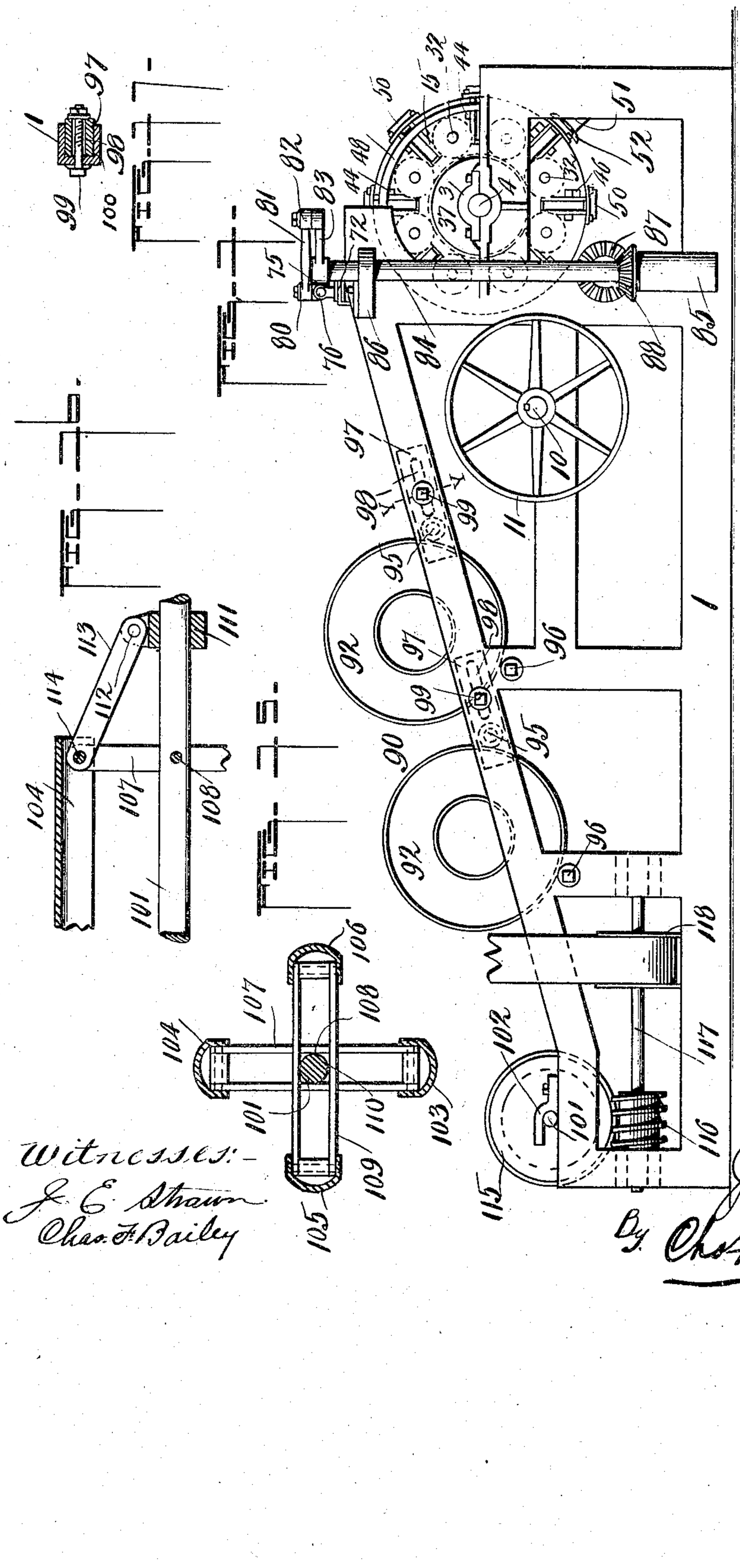
WIRE FABRIC MACHINE.

APPLICATION FILED MAY 2, 1903.

923.771.

Patented June 1, 1909.

6 SHEETS—SHEET 1.



Witnesses:-
J. E. Shaw
Chas. F. Bailey

Inventor.
John L. Claudin
By Chas. F. La Porte
Atty.

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FIG. 2.

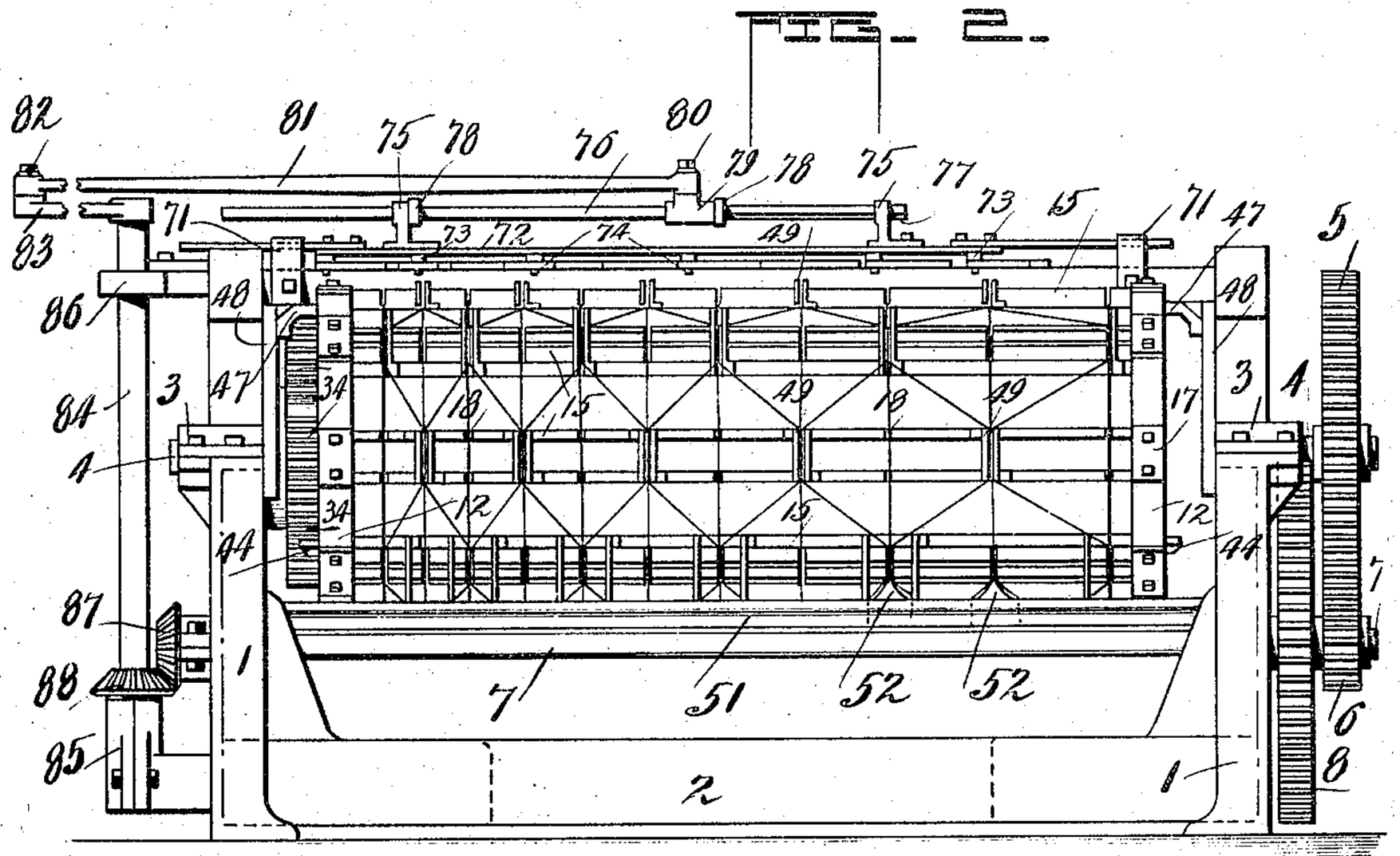
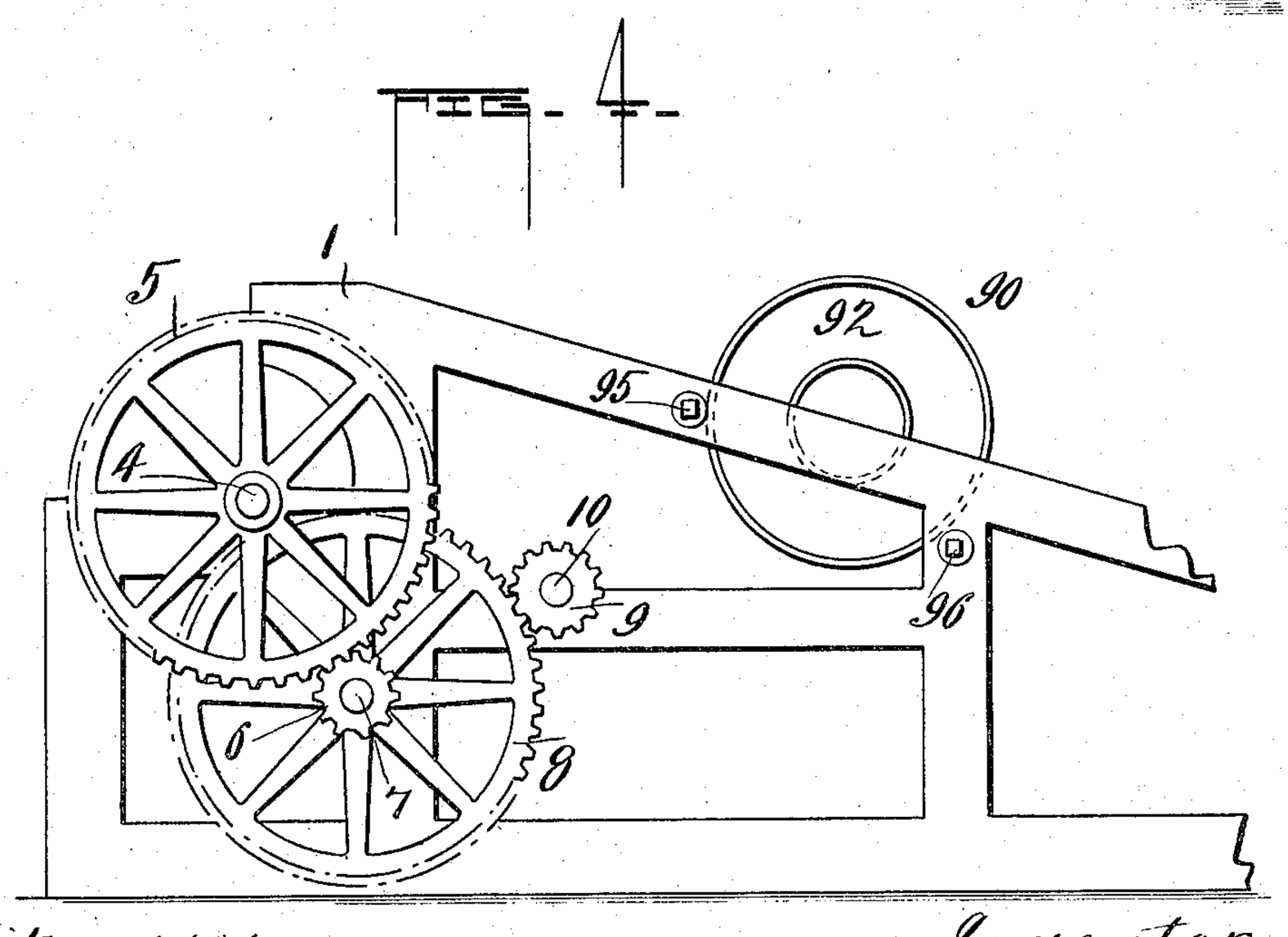


FIG. 4.



Witnesses:-
J. E. Strawn
Chas F. Bailey

Inventor.
John L. Claudin
By Chas F. La Porte
Atty

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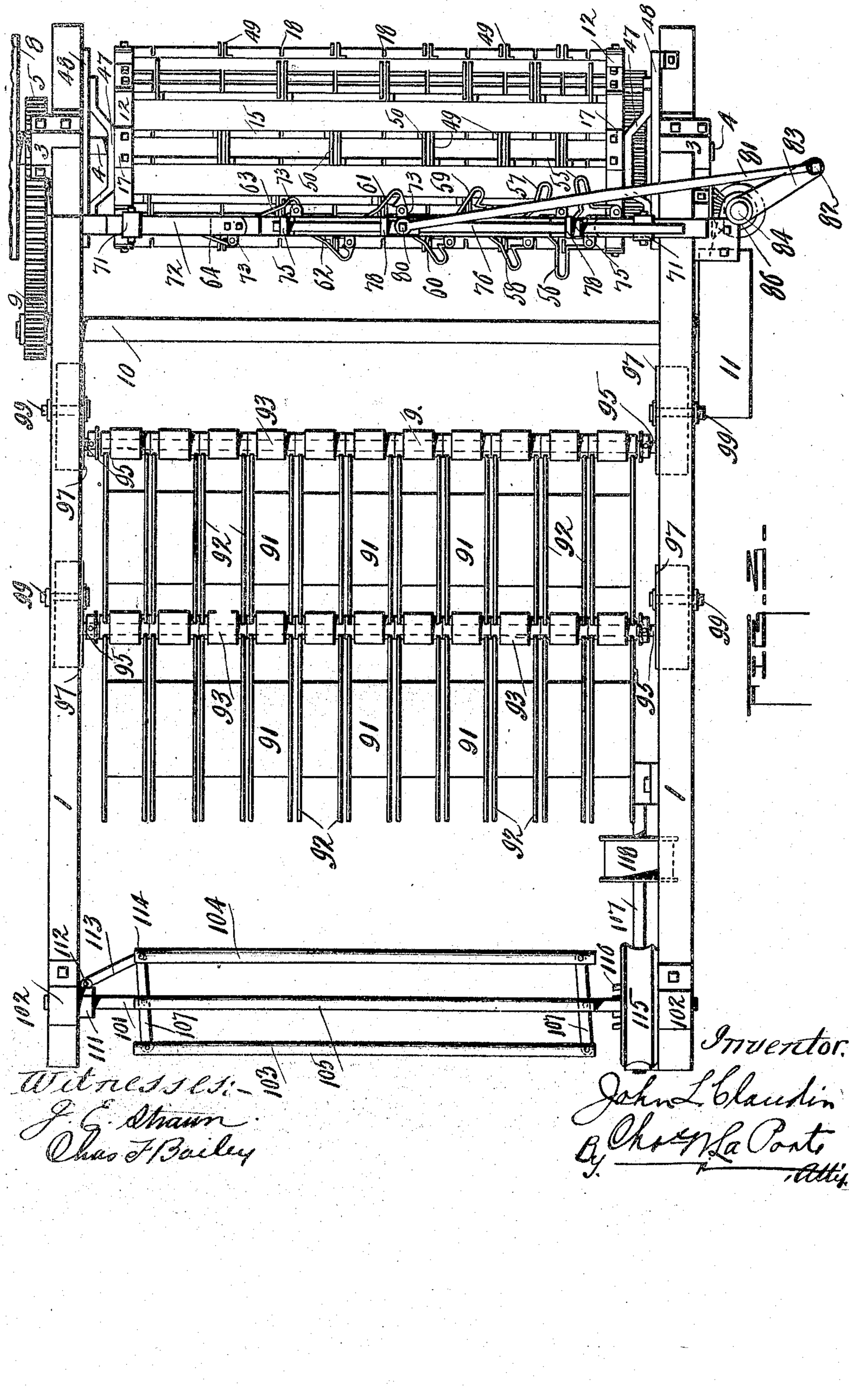

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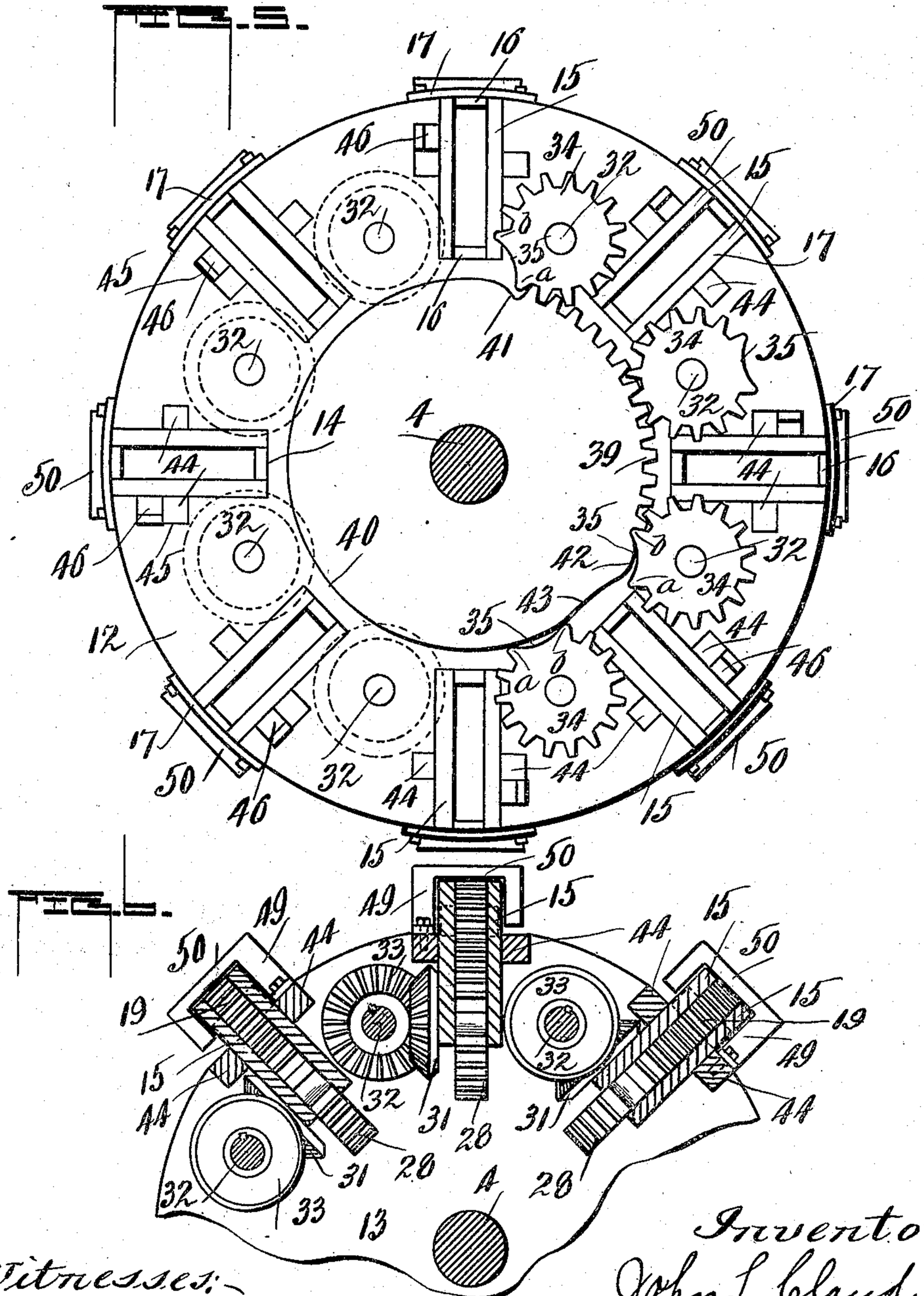

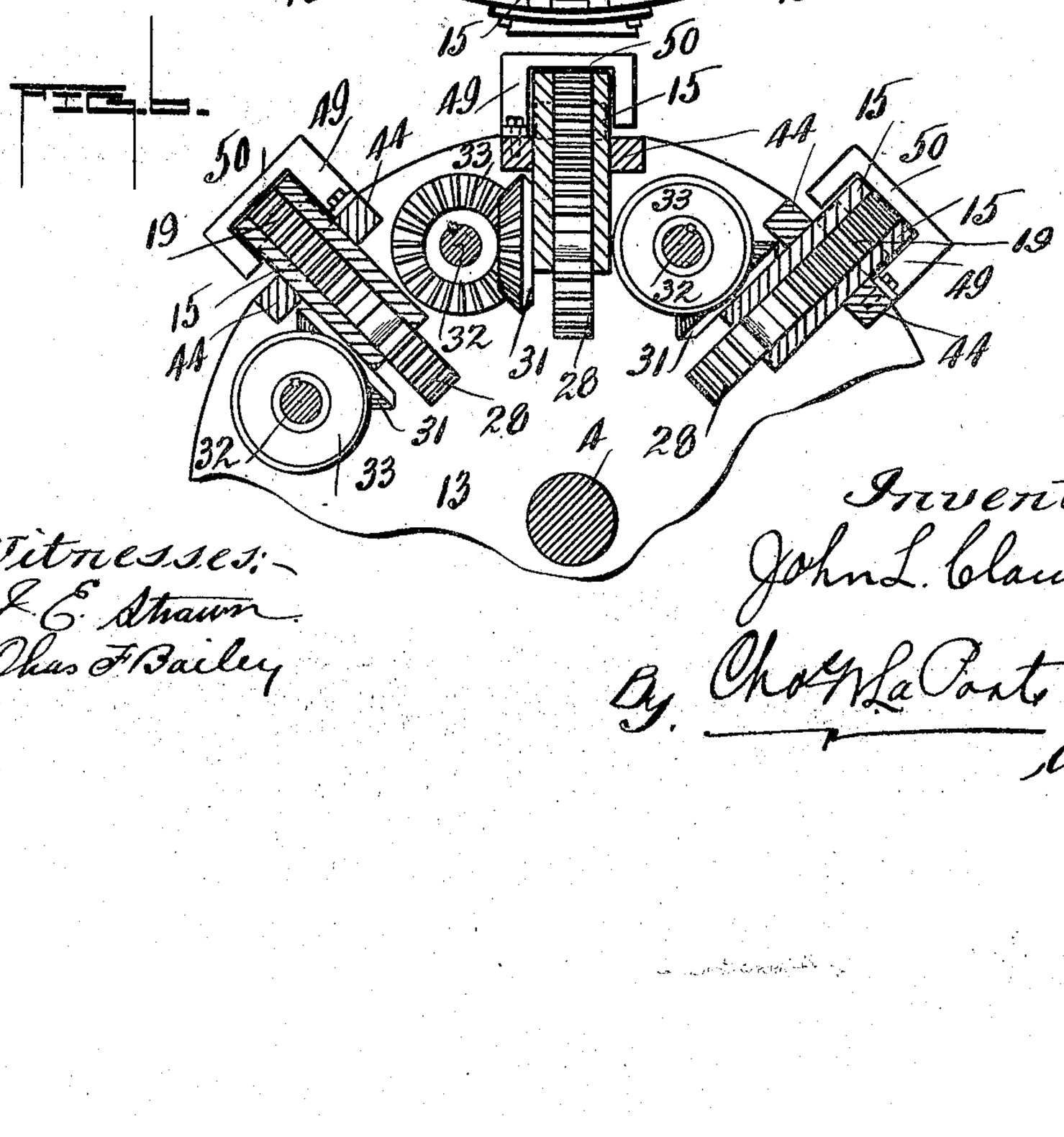

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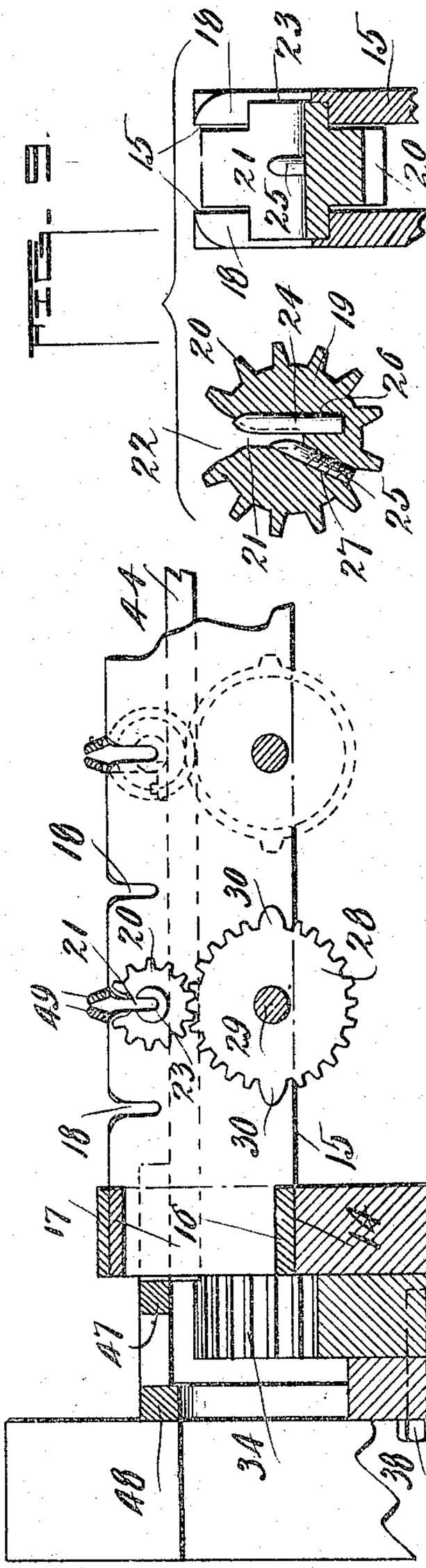

FIG. 5.

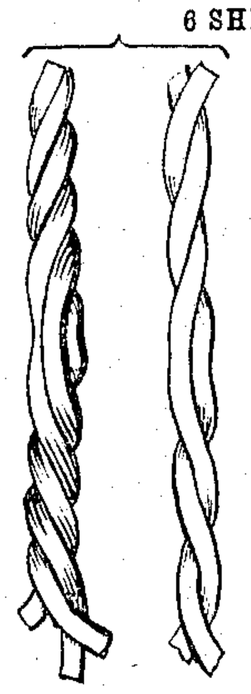

FIG. 18.

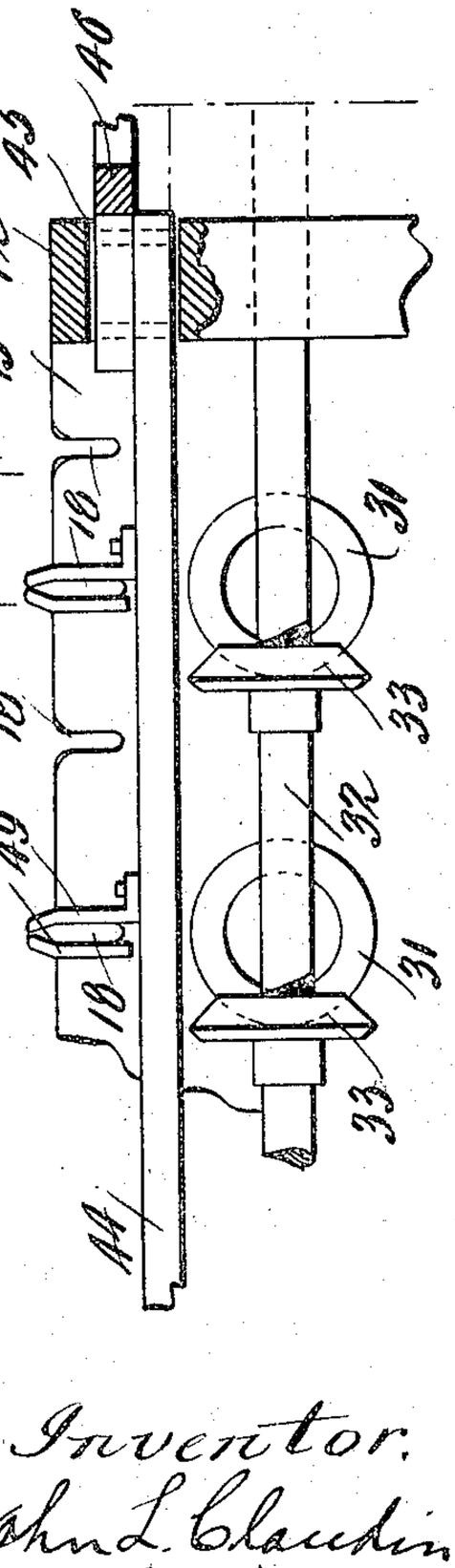

FIG. 2.

FIG. 1.

Witnesses:-
J. E. Strawn
Chas F. Bailey

Inventor:
John L. Claudin
By Chas F. LaPorte
Atty.

J. L. CLAUDIN.

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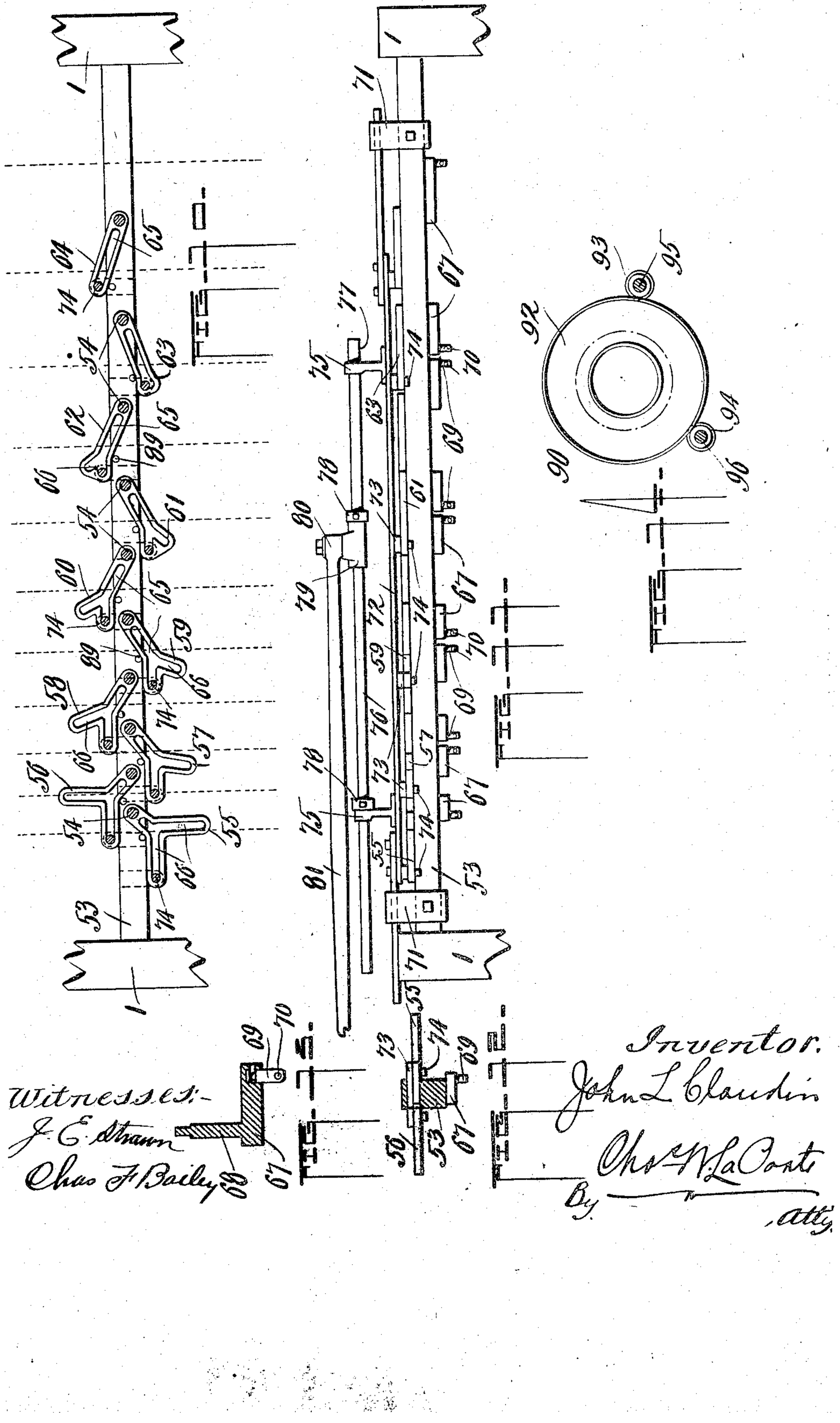

Witnesses:-

J. E. Strawn

Chas F. Bailey

Inventor.

John L Claudin

Chas H. LaCoste

By

Atty.

UNITED STATES PATENT OFFICE.

JOHN L. CLAUDIN, OF MORTON, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO INTERLOCKING FENCE COMPANY, OF MORTON, ILLINOIS, A CORPORATION OF ILLINOIS.

WIRE-FABRIC MACHINE.

No. 923,771. Specification of Letters Patent. Patented June 1, 1909.

Application filed May 2, 1903. Serial No. 155,438.

To all whom it may concern:

Be it known that I, JOHN L. CLAUDIN, a citizen of the United States, residing at Morton, in the county of Tazewell and State of Illinois, have invented certain new and useful Improvements in Wire-Fabric Machines; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

This invention has reference to machines for the manufacture of wire fabric or netting and is an improvement on the co-pending application filed by me on Mar. 31, 1902, bearing Serial Number 100,774.

For a detail of one or more forms of fabric or netting made on my machines, attention is directed to my patents numbered 739,797 and 739,798, issued Sept. 22, 1903. It will be seen that this fabric or netting is formed of selvage strands or margin wires, mesh forming wires, and of intermediate strand or line wires; and the mesh forming wires are interlocked or intertwisted with each other, with the intermediate line wires and with the selvage strands or margin wires to form a hexagonal mesh, the meshes being graduated from top to bottom of the fabric, or not, as may be desired. Attention is also called to the interlocking twists of the mesh wires, which are right and left, or left and right, or alternately right and left and left and right.

The object of the present invention, while embodying the principle of a revolving frame or drum carrying a series of twister sections adapted to receive a series of wires and intertwist them during the revolving of the frame and delivering a finished fabric, is the provision of new and improved means for actuating the said twisters, the power devices therefor having a predetermined movement and adapted to actuate the twisters and place them in a position to receive the wires and after twisting the said wires to retain them in a position to permit the finished fabric to be released therefrom.

A further object of the improvement herein is to provide a power gear from which the driving devices of the twister sections receive their power and such gear is provided with a camlike surface adapted when the twisters have completed their turn for interlocking or intertwisting the wires to cause the twisters when finishing to revolve slightly beyond the point necessary to complete an interlock or intertwist of the wires, for the purpose of overcoming the spring of the wire. The necessity for this is, that in intertwisting two wires there is a tendency after the wires have been twisted to spring back and unless they are twisted slightly more than necessary the twist will not be firm, but by the arrangement herein, I overcome this objection by the power gear referred to and herein to be more fully described which will accomplish slightly more than a turn of the twisters to provide for the extra spring of the wires in the twist.

A further object of the invention is a series of guides slidably arranged adjacent to the twisters for guiding the wires to the twisters as they are shifted to form a hexagonal mesh. These guides, in view of the opposite twist given to the fabric, are automatically shifted alternately upon opposite sides of the machine and during the revolving of the frame. And means is provided carried by a suitable support for automatically separating the guides to permit of the release of the wires of the fabric as the same is drawn away in a completed form.

A further object of the invention is a new and improved shifting device having a predetermined movement for automatically separating and shifting the mesh forming wires of the fabric to deliver the same to the twisting devices or for positively urging the moving wires into the said twisting devices of the revolving frame as they move into position during such revolving thereof.

A further object of the invention is a new and improved wrapping device for the finished fabric; and this consists of a shaft and a series of rods pivotally connected with said shaft and with each other, designed when removed from the machine to close together for the easy removal thereof from the roll of fabric wrapped thereon.

The invention consists further in the provision of wire drums or reels supported upon means to be frictionally rotated, said means being adjustable to provide for increasing or decreasing the tension on the wires fed from the reels or drums to the revolving frame.

The invention comprises details of arrangement and the construction of parts hereinafter more fully set out in the specification, illustrated in the accompanying drawings, and claimed in the appended claims.

In the drawings:—Figure 1 is a side elevation of one side of my improved fence fabric machine; Fig. 2 is a front elevation of my machine; Fig. 3 is a plan view; Fig. 4 is a side elevation of a portion of the forward end of the side opposite to that shown in Fig. 1 to illustrate certain gearing; Fig. 5 is an end elevation of the head end of the revolving frame, the driving devices for imparting power to the twisters and the power gear for imparting motion to the driving devices; Fig. 6 is a partial cross section through the revolving frame showing in elevation several twister sections and the arrangement of the twisting devices for the twisters; Fig. 7 is a partial longitudinal section through the revolving frame showing a side elevation of one or more twisters, their support and the means for twisting the same; Fig. 8 is a detail view showing in elevation, one or more wire guides and the relation thereto of the driving mechanism for the twisters; Fig. 9 is a detail showing two opposite sectional views of a twister; Fig. 10 is a plan view showing certain parts which comprise the wire shifting mechanism; Fig. 11 is an elevation of Fig. 10 with the addition of suitable mechanism for shifting the parts seen in Fig. 10; Fig. 12 is an end elevation of a portion of Fig. 11; Fig. 13 shows a section of one of the wire carriers and shifter; Fig. 14 is an elevation and section of a wire supply reel or drum and its frictional support; Fig. 15 is a cross section of the fabric wrapper; Fig. 16 is a longitudinal section showing a portion of one end of the wrapper; Fig. 17 illustrates a detail in cross section taken on the line Y—Y of Fig. 1; and Fig. 18 is a detail view showing two different forms of twists which may be made by this machine.

Like characters of reference indicate corresponding parts of the figures.

In the drawings, 1 indicates longitudinal frame parts of my machine serving as a support for the wire twisting devices, the wire feeding reels, and wrapping mechanism, the forward end of the frame parts 1 being connected and braced by the connecting frame 2.

3 indicates boxings arranged at the point seen in the drawings at the forward end of the frame parts 1 and in these boxings is journaled a shaft 4, upon which is mounted a frame or drum to be more fully described as a revolving frame carrying the twisting devices referred to. On one side of the machine, upon the shaft 4, is carried a gear wheel 5, which gear meshes with a pinion 6 on a shaft 7. On the shaft 7 and adjacent to the pinion 6 is carried a gear-wheel 8 which meshes with a pinion 9 on a power shaft 10; and on this power shaft 10, at the opposite side of the machine, is carried a driving pulley 11 adapted to receive its power from any suitable source and by any suitable means.

Referring to the revolving frame or drum, previously mentioned, the same comprises the head sections or disks 12 upon opposite ends of the shaft 4 and between the frames 1, as seen in the drawings, and the intermediate disks 13. These head sections and disks are similar in construction to those employed by me on my machine shown in application bearing Serial Number 100,774. Each of the head sections and disks is provided with the grooved portions 14; and for convenience, I have shown eight of such grooves in each head section or disk. 15 are parallel frame parts or removable twister supports, each forming a part of the revolving frame, extending from head-section to head-section and are seated within the grooves 14, best seen in Fig. 5. These frame parts 15 are designed to be separated apart from each other and held in such position and for this purpose, I provide the spacing blocks or plates 16. And the grooves 14 in the head sections being cut in from the edge of the disks, to prevent the frame parts 15 from becoming dislodged, I provide the covering plates 17. The parallel frame parts 15 are provided, as will be seen, with the slots 18 forming wire grooves in which are automatically placed intermediate line wires, mesh-forming wires, and cable strands or margin wires, of a fabric, to be engaged by twisting devices revolubly carried and supported between the parallel frame parts 15, and herein described. The parallel frame parts 15 in their arrangement are in pairs, thus the slots or wire grooves 18 must of necessity be opposite to each other, and for convenience, in making a graduated mesh fabric, the wire grooves or slots 18 are spaced at graduated intervals apart, as seen in the figures; however, this graduated mesh is not absolutely necessary and the slots may be made at graduated distances apart or at uniform distances from each other, whichever is most desirable. And in manufacturing a fabric having a hexagonal mesh, it is preferable to dispose the twisters, to be described, in staggered arrangement. That is, they are disposed in longitudinal rows between the parallel frame parts to coincide with each alternate wire groove or slot 18 across the machine and at each alternate wire groove or slot in each succeeding pair of frame parts 15 arranged circumferentially on the revolving frame.

The twisting devices which have been referred to and which are best seen in Figs. 7 and 9 of the drawings, are designated as 19 and are provided with the gear teeth 20. They are each provided with a central groove or wire slot 21, passing down into the body of the twister, approximately to the center thereof and are of such a formation as to do away with one of the teeth of its series, leaving the expanded opening 22 at the head of the slot 21. Each twister is provided with an extended bearing 23 from opposite sides

thereof and the slot 21 extends through such bearings, as seen in the figures. By the bearings 23, the twisters are journaled in opposite parallel frame parts 15, as best seen in Fig. 9. Each twister is provided with a suitable clamping device, which comprises the pins 24 and 25. The pin 24 is designed to be driven into an elongated opening 26 extending down into the body of the twister, access thereto being had from the slot 21. The pin 25 is threaded and is screwed into a threaded opening 27 at a point between two of the teeth of the said twister, the opening 27 extending through the twister and communicating with the slot 21 thereof. The pin 25 extending at a suitable angle into the twister with reference to the pin 24, any wear on the pins can be taken up by adjusting the threaded pin 25. The pins 24 and 25 which serve as a clamp in the body of the twister to engage two or more wires for interlocking or intertwisting the same, may be arranged in the form shown in the drawings; or the pins, if desired, may be both driven in from the periphery of the twister, and I do not wish to confine myself to a clamp comprising two pins where one is adjustable and the other is not, as the pins may be of such a material that the wear thereon being so great, it would be preferable to employ pins both of which are adjustable or neither one adjustable. Associated with each twister, is a gear wheel 28 carried on the short shafts 29 journaled transversely through the parallel frame parts 15 (see Figs. 6 and 7), and to accommodate such gears 28 to the teeth of the twisters, I provide at opposite points thereon the larger teeth 30 which are adapted during the revolving of the twisters and the gears 28 to mesh in the expanded openings 22 of the twisters formed by the slots 21. On one end of each of the shafts 29 and adjacent to the outer face of one of the frames 15, is carried a bevel gear 31. 32 indicates longitudinally arranged shafts, which are journaled at their opposite ends in the head sections 12 and these shafts are arranged in a series, one shaft between each adjacent pair of parallel frames 15, and on said shafts is provided a series of bevel gears meshing with the gears 31 of the shafts 29. And for the purpose of imparting a reverse movement to each alternate row of twisters, the bevel gears 33 are placed with their acting faces just opposite on each succeeding shaft 32, see Fig. 6 of the drawings. The purpose of this opposite twist, as stated in the preamble of the specification, is to twist all mesh wires in a row across the width of the fabric right and left and each alternate row left and right; however, this is not absolutely necessary as all the twists could run in the same direction and the gearing so carried as to do such work.

On one end of the shafts 32 outside of one of the head sections and adjacent thereto, I provide and carry the gears 34, and the teeth of such gears are so arranged as to provide a camlike surface 35 for a purpose to be described. Each of the gears 34 is designed, during the revolving of the frame parts, to intermesh with and be rotated by a segmental cam gear 36 which has a fixed connection with a disk 37 by means of the bolt 38, and the said disk 37 is in turn fixedly attached to the frame parts 1. The cam gear 36 referred to has the toothed portion 39 and the cam portion 40 which would be on a center line, approximately through the pitch line of the teeth, although this is not absolutely necessary and may be varied. At a point where the cam surface 40 enters the toothed portion of the gear is provided the depressed portion 41 of the cam 40, and where the toothed portion of the gear leaves off and emerges into the cam surface 40, I provide the swelled, extended, or irregular portion 42. Now then, attention being called to Fig. 5 of the drawings, as the frame revolves, the gears 34, as they move over the cam surface 40, are held in a fixed position and stationary by their teeth *a* and *b* riding on the surface of the cam; and during the further revolving of the frame, the tooth *a* of each succeeding gear, as it reaches the depressed portion 41 of the cam, will impart a slight rotating movement to such gear and the same will roll into mesh with the toothed portion 39 of such cam gear 36, and said gears 34 will continue to revolve during such intermeshing with the toothed portion 39 until the tooth *b* passes beyond the last tooth of the portion 39 when the camlike surface 35 of the gears 34 will be caused to ride around upon the swelled or irregular portion 42 of the cam 40 and ride over the slightly depressed portion 43 of the cam and onto the cam surface 40 and remain in such position until the gears again coincide with the toothed portion 39 during the continued revolving of the rotating frame. Thus it will be seen, that during the revolving of the frame carrying the twisters, through the gears 28 on the shaft 29 and the bevels 31 and 33, the latter carried by the shafts 32, which carry the gears 34, the said twisters will be rotated at a pre-determined period for a given length of time and then retained in a fixed position during the further revolution of the frame.

By reference to Fig. 5, it will be seen that two rows of twisting devices are always in mesh, for by the arrangement, as one gear 34 leaves the toothed portion 39 of the cam gear, another gear 34 is caused to enter and intermesh with such toothed portion. The depressed portion 41 of the cam gear, is to place the gears 34 smoothly into mesh without jar or jerk and in providing the swelled or irregular portion 42 of the cam gear and the slightly depressed portion 43 together with the camlike surface 35 of the gears 34, I am enabled

to give to the gears 34, as they leave the toothed portion 39, an additional partial revolution for the purpose of carrying the twister sections slightly beyond their normal point of stopping and to release the wires carried thereby after twisting said wires, to provide for the spring in such wires, permitting the twisted portions of the wires to spring back, which is their natural tendency, and for a perfect and compact intertwisting of the wires. If this provision of adding an additional partial revolution to the twisters, accomplished by the portions 42 and 43 of the cam gear and the cam surface of the gears 34, when the fabric was removed from the machine, were not made, the wires, where they were intertwisted, would be loose and of course the fabric could not be stretched up, as would be desirable, as the tendency would be to separate the wires and the expansion and contraction, which is a feature to be taken into account, could not be attained as perfectly as is attained in my fabric by the provisions of the means here shown and described for properly twisting and accounting for the spring in the wires.

44 indicate longitudinally disposed rods extending through the rotary frame which lie adjacent to the parallel frame parts 15, and at the opposite ends of the machine, pass through the perforations 45 in the head sections, see Figs. 5, 7 and 8. On the opposite end of each alternate rod 44 is suitably secured a lug 46, and the openings 45 in the head sections coincident with such lugs 46, are made of suitable size to carry the rods 44 and the lugs 46, see Fig. 8. During the revolving of the frame, it is designed to reciprocate the rods 44 and each alternate rod in opposite directions. To accomplish this, I provide the cams 47 supported by the frame parts 48 attached to the main frames 1. As the rotating frame is revolved, the lugs 46 projecting into the path of the cams 47, are engaged by the same, which will reciprocate the rods to which the lugs 46 are attached. The object of the rods 44 is to carry a series of guides 49, and the said guides have the angular portions 50 which overlie and move above the parallel frame parts 15; there being a series of the guides 49 for each parallel frame part to coincide with each twister section of each pair of said frame parts; and each alternate guide is secured upon opposite rods 44, lying adjacent to each pair of frame parts 15, thus, as each rod is moved in the manner just described, a pair of the guides 49 are brought adjacent to each other, coincident with the slots 18 which communicate with the twister sections of that pair of parallel frames 15. The object of the guides is to assist in directing the mesh forming wires into their proper slots and twisters of the revolving frame, as the said wires are shifted to coincide with the margin and intermediate line wires, with which they are to be intertwisted or connected. As the frame revolves and the gears 34 move away from the toothed portion of the cam gear 36, it is necessary to separate the wire guides 49 to permit the finished fabric to be drawn away from the revolving frame; and to accomplish this, I have provided a frame part 51 suitably supported by the frames 1 to which is secured the tapered cams 52, which are struck on an arc of a circle to correspond to the circumference of the frame and are placed in such a position as to enter between the guides 49 and separate them, which will shift the rods 44 outwardly to place the lugs 46 in a position to engage the cams 47, just previously described.

I will now describe the means for shifting the mesh-forming wires which are fed to the twister sections; 53 indicates a cross bar or supporting frame, its opposite ends attached to the frame parts 1. On the frame 53, I pivot at 54 for oscillation, a series of bifurcated, camlike plates 55, 56, 57, 58, 59, 60, 61, 62, 63 and 64, each of which is provided with slots 65. Starting with the plate 64, the slot 65 is approximately straight and in each succeeding plate, the slots diverge into the graduated and elongated bifurcations 66. On the under side of the frame part 53, I provide the series of graduated shifting arms 67, having the stems 68 passing up through the bar 53 on which are carried the pivoted plates 55, 56, 57, 58, 59, 60, 61, 62, 63 and 64 and form the pivot 54 of each plate. In the outer free end of each of the shifting arms is swiveled the depending stems 69 the arrangement of the swivel being best seen in Fig. 13 and in the lower end of the stem 69, I provide the wire perforations 70. Overlying the bar 53 and adapted to be reciprocated above the same and passing through the guide 71, is a bar 72, and secured to said bar 72 and projecting laterally therefrom alternately upon opposite sides, is shown a series of plates 73 from which depend the short studs 74 which are designed to operate in the slots 65 and 66 of the series of plates 55—64, best seen in plan in Fig. 10. Attached to the bar 72 are shown guiding blocks 75, through which is reciprocally carried a rod 76, one end of which has the squared portion 77, passing through a corresponding slot in the guiding block 75 to hold the said rod 76 always in one position.

On the rod 76 are carried the adjustable collars 78 and the fixed sleeve 79; and to the fixed sleeve 79 is pivotally attached at 80, a pitman bar 81 and the opposite end of said pitman is pivotally attached at 82 to a crank 83 carried on the upper end of the vertically disposed shaft 84, the latter journaled in the boxing 85 at its lower end and the bearing 86

at or near its upper end, motion being imparted to said shaft 84 through the shaft 7 on which is arranged a bevel gear 87, meshing with a bevel gear 88 on the shaft 84. For providing a fabric whose meshes are graduated, it will be noticed that the shifters 67 must be graduated in length and that certain of the plates to which the stems 68 of the shifters 67 are attached must be moved in advance of each other so that the mesh-forming wires passing through the pins 69 of the shifters will simultaneously coincide with the slots 18 of the frames 15 which are moved into position to receive such wires. In Fig. 10, it will be noticed that a series of strand or intermediate line wires are shown in dotted lines to illustrate that the pivots 54 of the plates and twisters are centrally disposed between a point where the line wires are fed to the rotating frame. The collars 78 on the rod 76 are so placed with reference to the guides 75 that the rod 76 will have a predetermined and yet limited amount of movement before the bar 72 to which the guides 75 are attached, is shifted; this is to allow sufficient time for the rotation of the revolving frame to bring the twisters into position to receive the mesh-forming wires when the wire shifters have been moved into position to deliver the wires thereto. And during the movement of the bar 72, it will be seen that the plates 55, having the longer bifurcations, are the last to be oscillated because their shifters have the least distance to travel. For instance, the plate 64, as the bar 72 begins its movement, will be moved simultaneously therewith, but as the succeeding plates 63, 62, 61, etc., have each the graduated elongated slots, the pins 74 will travel the distance of such slots before the plates are correspondingly moved, all of which, it is believed, is apparent from an examination of the figures. To limit the play of the slotted plates I provide the pins 89 with which the said slotted plates engage during their movement.

The selvage or margin wires as well as the intermediate line wires are directed to certain of the twisters of the revolving frame without lateral deflection, while the mesh forming wires are deflected to certain of the twisters out of alinement, whereby they are caused to alternately coincide with adjacent line wires and adjacent line and margin wires to be intertwisted therewith.

The height of fence adapted to be made by the machine herein shown and described, contains eleven line wires, see the same in dotted lines Fig. 10; the outside wires being the selvage or margin wires, and ten mesh forming wires which are adapted to be connected with the said intermediate and margin wires, somewhat in the manner seen in Fig. 2. Or if desired a number of the line wires and mesh forming wires may be omitted which will present a much shorter fence and move the position of the margin wire, as it is not absolutely necessary on a machine of this type to always manufacture a fabric having the number of line wires to correspond to the number of twisters in a row, all of which it is believed will be understood.

In the operation of the revolving frame, the same is adapted to advance the wires fed thereto in unison, and the twisters carried thereby, as they move into proper position during the continued rotation of the frame are caused to receive certain of the wires which are deflected by the shifting mechanism, whereby, a fence fabric composed of margin wires, intermediate wires and mesh forming wires, is manufactured at a very rapid speed through the continuous rotation of the revolving frame.

The mesh-forming wires, cable strands or margin wires, and the intermediate line wires which go to form my fabric, are fed from a series of wire supply reels or drums 90. These drums consist of the body portions 91 around which the wire is reeled and the flanges 92. These reels or drums are supported to frictionally rotate on the frictional collars 93 and 94 carried by the shafts 95 and 96. The shafts 95 are journaled in blocks 97 and the said blocks are slotted at 98 through which slots are carried the securing bolts 99 upon which the blocks 97 are slidably adjustable by means of the slots 98. The shafts 96 are designed to be journaled in the frame parts 1. The frame parts 1 are channeled as seen at 100 in Fig. 17 to permit of the carrying of the blocks 97 so that they may be adjusted in their support. The object of using wire reels such as I show, and rotating them frictionally and upon devices which are adjustable, is to give to each wire reel an independent rotation that it may govern itself according to the supply of wire that is necessary in making the graduated meshes and to increase or decrease the tension of said wires by adjusting the blocks 97 which will raise or lower the reels on their supports, it being readily seen that the tension would be greater if the reels were lowered and lighter if they were raised, occasioned by the spreading apart of the shafts 95 and 96.

I have provided, in connection with my machine, as was intimated in the preamble of the specification, a fabric wrapper which might be known as a knock-down wrapper. This wrapper is composed of a shaft 101, journaled upon the frames 1 and at the rear of the machine in the slotted boxings 102, to permit of the easy removal of the shaft therefrom. The body of the wrapper consists of the series of oppositely placed channel bars 103, 104, 105 and 106; and the bars 103 and 104 are pivotally connected with each other by the straps 107 which are fulcrumed to the shaft 108, and the bars 105 and 106 are in

like manner pivotally attached to each other by the straps 109 which are fulcrumed to the shaft at 110, and the said straps bear across the shaft 101 in lines oblique to the axis of the center of said shaft as seen in Fig. 3, and with this arrangement, the tendency of the wrapper is to collapse. To assist in retaining the wrapper in a position to receive wire fabric, which also assists automatically to collapse the wrapper, I provide a collar 111, slidably carried on the shaft 101 and to this collar at 112 is pivotally connected a reach 113 which at its opposite end is pivotally connected with one end of the bars 105 and 106. In placing the wrapper on the machine, the collar 111 is shoved up toward the channel bars which will cause the same to assume a position as seen in the figures and the shaft 101 is then lodged in its bearings on the frame parts 1 with the collar 111 bearing against the journal of the shaft, as seen in Fig. 3; thus upon removing the shaft from its bearings, the collar will slide outwardly permitting the channels to collapse, when the wrapper may be removed from the roll of fabric. My object in using channel bars is to inclose the ends of the straps to avoid any projections on the outside of the wrapper which would have a tendency to catch in the meshes of the fabric as the wrapper is removed. On the shaft 101, at the opposite end from the collar, I carry a worm wheel 115, which when the shaft 101 is in a working position on the frame parts 1, will mesh with the worm 116 on shaft 117, the latter being journaled in bearings on the frame 1 and actuated by a belt-driven pulley 118, secured on the shaft 117.

It is believed that from the above description the operation of the various parts of the machine independently and combined for the purpose of weaving wire fabric, may be readily understood. And it is obvious that various changes and modifications may be made which would come within the scope of this invention, and I do not wish to be confined to the details herein.

Having thus fully described my invention, what I claim and desire to secure by Letters Patent of the United States, is:—

1. In a machine for the manufacture of wire fence, the combination of a revoluble frame, a series of longitudinal rows of twisting devices having their journals in said frame and provided with toothed peripheries, gears arranged in longitudinal rows to coincide and mesh with the said twisters, and means for actuating said gears, substantially as specified.

2. In a machine for the manufacture of wire fabric, comprising a revoluble and supporting shaft, a series of longitudinal supports mounted on the shaft, a row of twisting devices having toothed peripheries and mounted for rotation on each of said supports, gearing meshing with said twisters, and means for actuating said gearing.

3. In a wire fence machine, the combination of a revoluble support, a series of longitudinal rows of twisting devices journaled on said support and adapted to be intermittently actuated during the continued rotation of the support, means for clamping a wire or wires in the body of the twisters, gears arranged in longitudinal rows to coincide and mesh with said twisters, and means for actuating said gears, substantially as specified.

4. In a wire fence machine, the combination of a revoluble support, a series of pairs of parallel frames mounted on said support, revolubly supported twisting devices disposed in rows and journaled between the parallel frames, a driving shaft to each frame of the series, and gearing interposed between the twisters and the shafts, substantially as specified.

5. In a wire fence machine, a stationary bed, a rotating frame mounted on a shaft journaled in said bed, twisters mounted on the frame and in rows around the frame and also longitudinally of the frame, a gear having a fixed relation on the bed, and means carried by the rotating frame adapted to be actuated by the gear for imparting power to the twisters, substantially as specified.

6. A wire fence machine, comprising a revolving frame, a series of rows of twisting devices mounted for intermittent rotation in said frame, a cam gear fixed relative to the movement of the rotating frame, and gearing adapted to actuate the twisters by contact with said cam gear during a partial rotation of the frame, and to retain said twisters in a fixed position during the remainder of the rotation of said frame, substantially as specified.

7. A wire fence machine, comprising a revoluble frame, a series of rows of twisting devices mounted in said frame, a series of longitudinal shafts and gearing connecting the shafts and the twisters, gears carried on the ends of said shafts, a segmental gear having a cam surface having a fixed position relative to the movement of the rotating frame and adapted when engaged by the gears on the longitudinal shafts to impart an intermittent movement to the twisting devices during the rotating of the frame, substantially as specified.

8. In a wire fence machine, the combination of a series of twisting devices, a cam having a toothed portion and fixed to a stationary support, a longitudinally disposed shaft, a pinion on one end of such shaft, a series of gears on the shaft in operative connection with the twisters, the said pinion adapted when engaging the toothed portion of the cam to impart through the gears aforesaid power to the said twisters and when rid-

ing on the surface of the cam to hold the twisters stationary, substantially as specified.

9. In a wire fence machine, the combination of a series of traveling twisting devices, a cam fixed relative to the movement of the twisters and having a toothed portion, a traveling shaft carrying a series of gears adapted to impart motion to the twisters, a pinion on the end of said shaft having a cam surface, the cam surface of the pinion designed to ride on the surface of the first mentioned cam and the teeth thereof adapted to intermesh with the toothed portion of the cam for imparting an intermittent movement to the twisters, substantially as specified.

10. In a wire fence machine, the combination of a longitudinal row of twisters, a cam gear having a toothed portion 39 and the cam surface 40, a longitudinally disposed power shaft, gears on said shaft in mesh with said twisters, a pinion on the end of said shaft having the cam surface 35, and means for moving the shaft to cause the teeth of the pinion to mesh with the toothed portion of the cam for imparting movement to the twisters and moving the cam surface 35 of the pinion over the cam surface 40 of the cam gear, substantially for the purpose specified.

11. In a wire fence machine, the combination with a series of twisting devices, of the cam gear 36 having the toothed portion 39, the cam surface 40 and the swelled and depressed portions 42 and 43, a shaft and driving connections between the shaft and twisters, a pinion having a cam surface carried by such shaft, the toothed portion thereof designed to mesh with the toothed portion of the cam gear for revolving the twisters and as the pinion with its cam surface rides over the swelled and depressed portions of the cam to impart to such pinion an additional partial rotation and then retain the pinion in a fixed position during the remainder of its travel over the cam surface 40, substantially as specified.

12. In a wire fence machine, the combination of a pair of frame supports provided with a series of wire grooves, a series of twister sections journaled in said supports and provided with wire slots to coincide with the slots of the supports, a shaft and gearing connecting the shaft with the twisters, means for actuating said shaft to intermittently revolve the twisters, and means for imparting slightly more than a rotation to the twisters and returning the twisters to a position with their slots coinciding with the grooves in the support, substantially as specified.

13. The mechanism for actuating the twisters of a fence machine, comprising the disk 36 having the toothed portion 39 and the swelled and depressed portions 42 and 43, the pinions 34 designed to mesh with the toothed portion 39 and having the cam surface 35 and the teeth *a* and *b*, the cam surface 35 adapted to ride over the swelled portion 42 for the purpose set forth, and the teeth *a* and *b* adapted to ride on the remaining portion of the disk, substantially as specified.

14. In a wire fence machine, the combination of a revoluble frame, a series of pairs of supports mounted on the frame to rotate therewith and provided with wire grooves extending toward the axis of the frame, twisting devices journaled to revolve at right angles to the rotation of the frame, and reciprocally arranged wire guides upon opposite sides of the supports and having portions overlying the edges thereof for directing wires to the grooves in the said supports, substantially as specified.

15. In a wire fence machine, the combination of a revoluble support, a pair of frames mounted to rotate with the support and having wire grooves extending toward the axis of the support, twister sections journaled between the frames and coinciding with each alternate groove thereof, reciprocal wire guides having portions overlying the frames, and means for automatically shifting said guides to direct wires to the twisters, substantially as specified.

16. In a wire fence machine, the combination of a revoluble support, a series of twisting devices mounted in said support and adapted to be intermittently revolved during the continued rotation of said support, means for actuating the twisters, reciprocally disposed members carried by said support and having wire guides which coincide with said twisters which are adapted to be moved toward and from each other for drawing wires into the twisters, and means for intermittently and automatically shifting said guides, in a manner and for the purpose specified.

17. A wire fence machine, comprising a stationary bed, a revoluble frame mounted for rotation on said bed, a series of rows of twisting devices journaled for rotation in said revoluble frame, means for intermittently actuating each row of twisters during the rotation of the frame, a series of longitudinally movable rods mounted in said frame, wire guides carried by said rods, means for moving the rods to bring the guides adjacent to each other, and means for separating the guides, substantially as specified.

18. A wire fence machine, comprising a stationary base, a revoluble frame mounted for rotation on said base, a series of rows of twisting devices, means for actuating the twisters, a series of pairs of longitudinally movable rods mounted in said frame, wire guides alternately secured to each pair of rods, means at the opposite ends of the revoluble frame for intermittently moving the rods in opposite directions, and means for

separating the guides after the rods have been shifted, substantially for the purposes specified.

19. A wire fence machine, comprising a base, a frame mounted for rotation on said base, a series of rows of twisting devices disposed alternately circumferentially of said frame, a pair of wire guides for each twister, a longitudinally movable support for said guides, a cam adapted to be engaged by said supports for moving the guides adjacent to each other during the rotation of the frame, and means for separating said guides after a partial rotation of the frame, substantially as specified.

20. In a wire fence machine, the combination of a rotating frame, a series of intermittently revolved twisters journaled for rotation in said frame, wire guides for each twister mounted on a movable support in the rotating frame, a fixed cam adapted to be engaged by the supports for moving the guides toward each other during the rotation of the frame, and means for separating the wire guides, substantially as specified.

21. In a wire fence machine, the combination of a rotating frame, a series of rows of twisting devices mounted in said frame, a pair of movable supports lying each upon opposite sides of the twisters, wire guides for directing wires to each twister secured alternately to the rods upon opposite sides of said twisters and having extensions overlying and movable above the twisters, suitable members attached to said supports and upon the opposite ends of each alternate support, and means engaged by said members during the rotation of the frame for shifting the said supports, substantially for the purposes specified.

22. In a wire fence machine, the combination with twisting devices, of a series of wire drums from which wire is fed to the twisters, the said drums having flanges and supported for frictional rotation upon independently movable supports, substantially as specified.

23. In a wire fence machine, the combination of a pair of rods on which is mounted a series of collars, and a series of drums adapted by their peripheries to be supported for frictional rotation on said collars, substantially as specified.

24. In a wire fence machine, the combination of a pair of rods one of which is mounted in an adjustable support, a series of collars mounted for rotation on said rods, and a series of wire drums adapted by their peripheries to be supported for frictional rotation on said collars and independently of each other, substantially as specified.

25. In a wire fence machine, the combination of a series of wire reels, a support for said reels, and means for adjusting said support to increase or decrease the tension of wires drawn from the reels, substantially as specified.

26. In a fence machine, the combination of a series of traveling twisters, means for operating the twisters, a series of pivotally arranged wire shifting plates, mechanism connecting said plates in series, and means for actuating such mechanism and thereby oscillating the said plates at predetermined intervals in the movement of said twisters.

27. Shifting mechanism for a wire fence machine, comprising a series of plates, wire shifters pivotally connected with said plates, and means for oscillating each succeeding plate slightly in advance of its preceding plate, for the purposes specified.

28. Shifting mechanism for a fence machine, comprising a series of plates, each succeeding plate from one side of the series provided with increased bifurcated grooves, wire shifters pivotally connected with said plates, means operating in the grooves of the plates for oscillating each succeeding plate in advance of its preceding plate, and power devices connected with the means operating in the grooves, substantially for the purpose specified.

29. Shifting mechanism for a wire fence machine, comprising a series of oscillating plates provided with sinuous grooves, wire shifters pivotally connected with said plates having depending swivel pins with wire openings, a reciprocally arranged bar, power devices for operating said bar, and means carried by the bar moving in the sinuous grooves of the plates, substantially for the purposes specified.

30. Shifting mechanism for the fence machine, comprising a series of oscillating plates, wire shifters connected with said plates and having a swiveled wire guide, a reciprocally arranged bar, connections between the bar and plates, a reciprocally arranged rod having a bearing in guides supported by the bar and provided with adjustable collars to engage the guides at predetermined periods, power devices, and connections between the power devices and the rod, substantially for the purposes specified.

31. Shifting mechanism for a fence machine, comprising a series of plates, oscillating shifters attached to said plates carrying swiveled pins having a wire perforation, a reciprocally arranged support, connections between the support and the plates, a power shaft, a crank on one end of the power shaft, and a pitman connection between the crank and reciprocally arranged support, operating substantially in the manner specified for oscillating the shifters through the plates and at predetermined periods.

32. A wire fence machine, comprising a revoluble frame, a series of twisting devices mounted in said frame and arranged in cir-

cumferential rows alternately across the frame, a series of oscillating shifters carrying wire guides, adapted to be shifted into position at predetermined periods to coincide with the twisters as they are brought into position by the revolving frame, and power devices for oscillating the shifters, substantially for the purposes specified.

33. A wire fence machine, comprising a revoluble frame, a series of twisting devices mounted for rotation in said frame, shifting mechanism, comprising a series of oscillating plates, wire shifters pivotally connected with said plates adapted to be shifted to coincide alternately with adjacent shifters, power devices, and mechanism connecting the power devices with the plates, substantially for the purposes specified.

34. A wire fence machine, comprising a revoluble frame, a series of rows of twisting devices arranged on said frame, a series of rows of gears, the same coinciding and in mesh with the twisting devices aforesaid, a series of longitudinally disposed shafts, means for actuating the said shafts, and connections between said shafts and the said gears.

35. In a wire fence machine, the combination with a revoluble drum, a longitudinal row of twisters mounted on said drum, a longitudinal row of gears carried by said drum and in mesh with the said twisters, and means for intermittently actuating said gears.

36. In a wire fence machine, the combination with a traveling support, a longitudinal row of twisters mounted on said support, a longitudinal row of gears carried on short shafts revoluble in said support and the said gears in mesh with the twisters, bevel pinions on one end of said short shafts, a longitudinal shaft, and bevel gears on said shaft in mesh with said bevel pinions.

37. A wire fence machine, comprising a revoluble shaft, twister supports mounted on said shaft, revoluble twisting devices journaled in said supports having their axes disposed in line with the travel of wire fed thereto, means for feeding the wires to the twisters, means for shifting the wires previous to their engagement by the twisters, gears meshing with said twisters, and means for actuating said gears.

38. In a machine for making wire fabric, the combination with a plurality of staggered wire connecting devices mounted to travel in unison, of means for leading a plurality of wires to each of said devices, means for deflecting certain of the wires laterally to form meshes, gears meshing with the said twisters, and means for actuating said gears.

39. In a loom for producing wire fabric from a plurality of continuously moving wires fed longitudinally in the same general direction, a support, several rows of twisting devices mounted on the support and movable in an endless orbit to present them in succession to the wires, gears meshing with each of said twisters, and means for operating said gears during a portion only of their travel.

40. In a machine for making wire fabric, the combination with a drum, of a series of staggered twisters extending around the drum and arranged to connect a plurality of moving wires, and gears disposed beneath the twisters and meshing with the same adapted to actuate the twisters at predetermined intervals.

41. In a machine for making wire fabric, the combination with a drum, of a plurality of twister supports removable from the drum, a set of twisters carried by each support and removable therewith, and gears in mesh with said twisters also carried by each of said supports.

42. In a machine for making wire fabric, the combination with means for advancing a plurality of wires, of twisters engaging a wire at intervals, a gear in mesh with each of said twisters, and means for operating the said gears and thereby the twisters during the transit of the wires to connect the same to adjacent wires by reverse twists.

43. In a machine for making wire fabric, the combination with a plurality of wire connecting devices in staggered arrangement, of a plurality of intermittently revoluble gears in mesh with said connecting devices, and means for operating said gears.

44. In a machine for making wire fabric, the combination with a plurality of twisters in staggered arrangement, of wire guiding and deflecting means associated with the twisters, a gear in mesh with each twister, and means for operating a plurality of gears at one operation.

45. In a wire fence machine, a revoluble drum, twisters mounted in rows around the drum and also longitudinally of the drum, a gear revolubly mounted beneath each twister and in mesh therewith, and means for actuating the gears in mesh with the longitudinal rows of twisters in succession.

46. In a wire fence machine, a revoluble drum, twisters mounted in rows around the drum and also longitudinally of the drum, a gear in mesh with each twister, longitudinal shafts mounted at intervals in said drum, connections between the respective shafts and the gears aforesaid, and means for operating said longitudinal shafts in succession.

47. In a wire fence machine, a revoluble drum having longitudinally extending rows of twister supports, each formed of a pair of oppositely located slotted frames, a series of gears mounted in said frames, a series of twisters also mounted in each of said frames in mesh with the gears aforesaid, and means for actuating said gears.

48. In a wire fence machine, a fence-forming revoluble drum having at intervals longi-

tudinally disposed revoluble shafts, a series of gears mounted longitudinally of the drum and adjacent to said shafts, connections between said shafts and said gears, slotted twister wheels mounted in mesh with said gears, and means for actuating said shafts in succession as the drum is revolved.

49. In a wire fence machine, a fence-forming revoluble drum having at intervals longitudinally disposed revoluble shafts, a series of bevel gears spaced at intervals on said shafts, a series of short shafts spaced at intervals in said drum and at right angles to the longitudinal shafts, bevel gears on said short shafts in mesh with the gears on the longitudinal shafts, a second gear on each of said short shafts, slotted twister wheels mounted in mesh with said second gears, and means for actuating said longitudinal shafts in succession as the drum is revolved.

50. In a wire fence machine, a fence-forming revoluble drum having at intervals longitudinally disposed revoluble shafts, a series of gears mounted longitudinally of the drum and adjacent to said shafts, connections between said shafts and said gears, slotted twister wheels mounted in mesh with said gears, means for rotating the drum, and means for operating the successive shafts at the same point in the travel of the drum.

51. In a wire fence machine, a fence-forming drum having at intervals a series of gears mounted in longitudinal rows on said drum, slotted twister wheels mounted in mesh with said gears, means for actuating said rows of gears successively as the drum is revolved, and means for limiting the actuating movement of said gears.

In testimony whereof I affix my signature, in presence of two witnesses.

JOHN L. CLAUDIN.

Witnesses:

JOSEPH HAUTS, JR.,

WM. GRIMM