H. E. BROWN.

FABRIC MAKING MACHINE.

APPLICATION FILED JUNE 17, 1916.

1,336,343.

Patented Apr. 6, 1920.

11 SHEETS—SHEET 1.

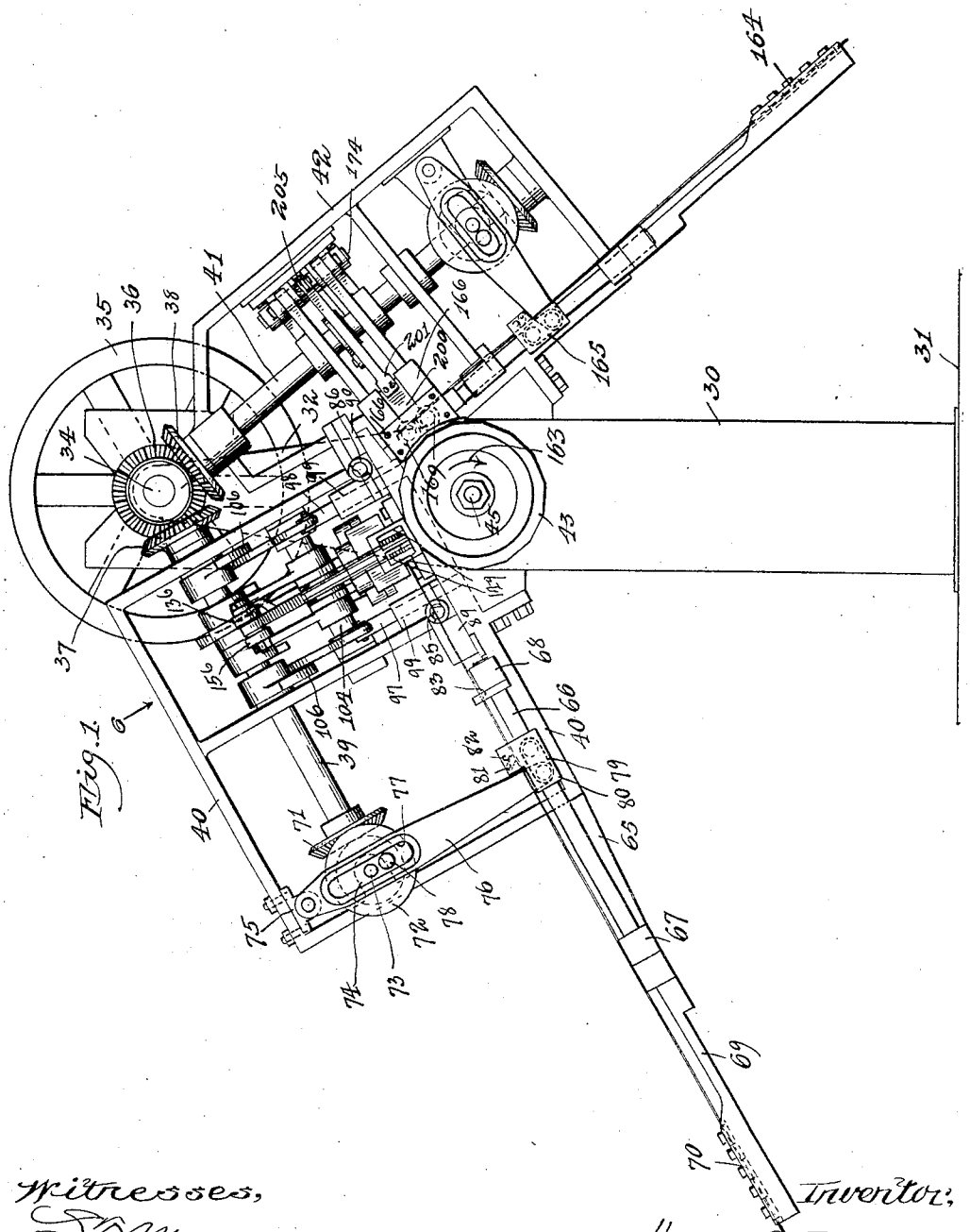


Fig. 1.

Witnesses,
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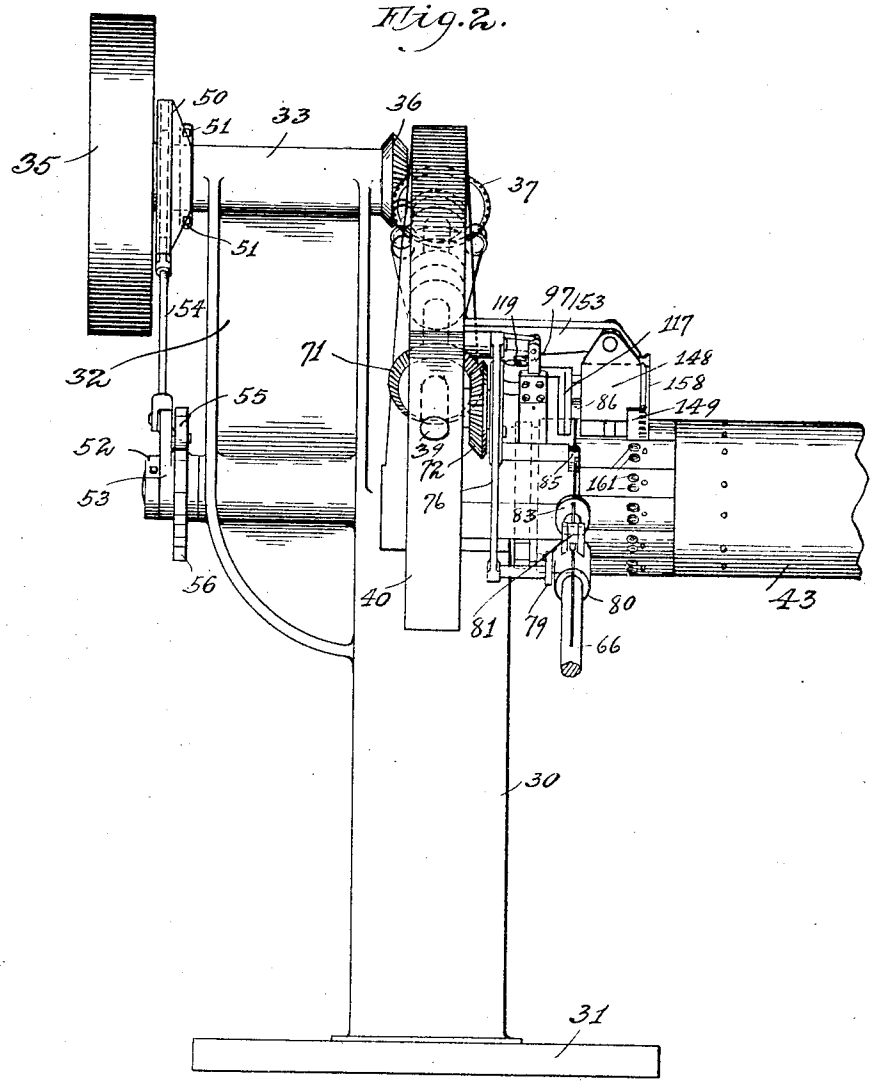
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11 SHEETS—SHEET 2.

Fig. 2.



Witnesses,

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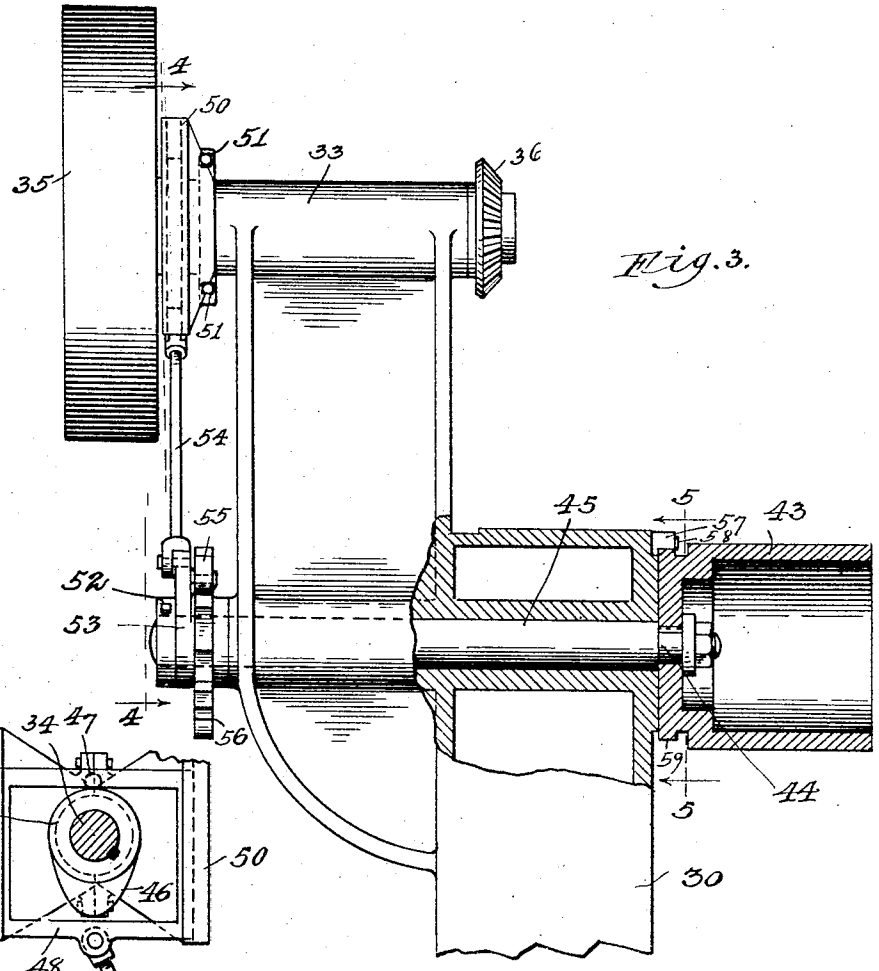
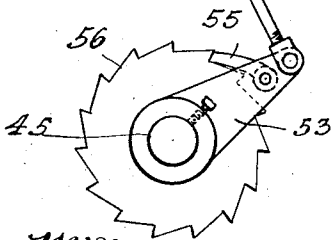


Fig. 3.

Fig. 4.



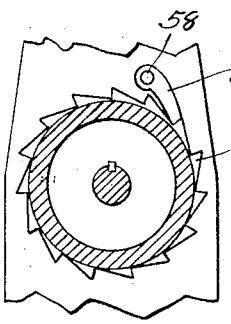


Fig. 5.

Witnesses,
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11 SHEETS—SHEET 4.

Fig. 6.

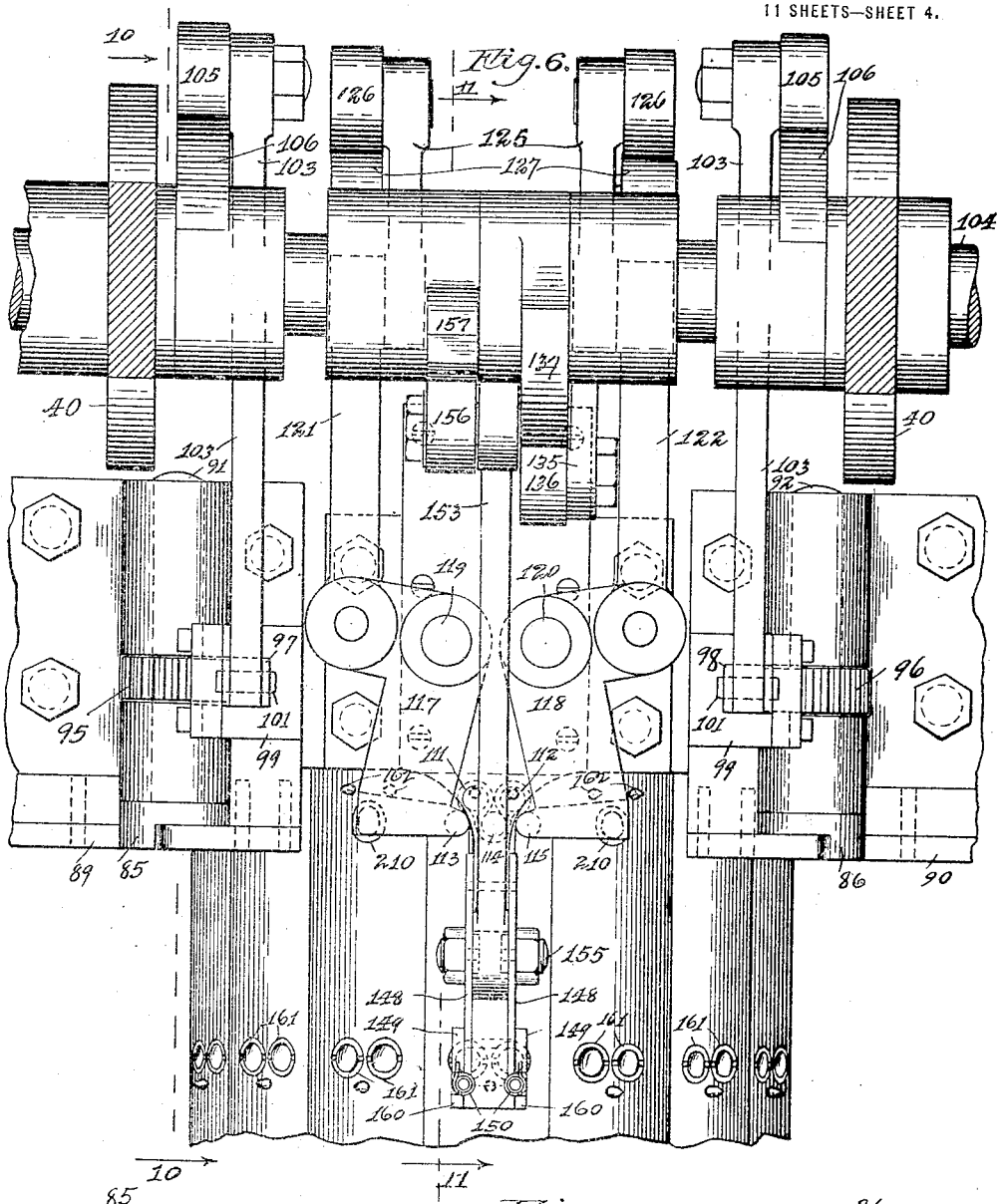
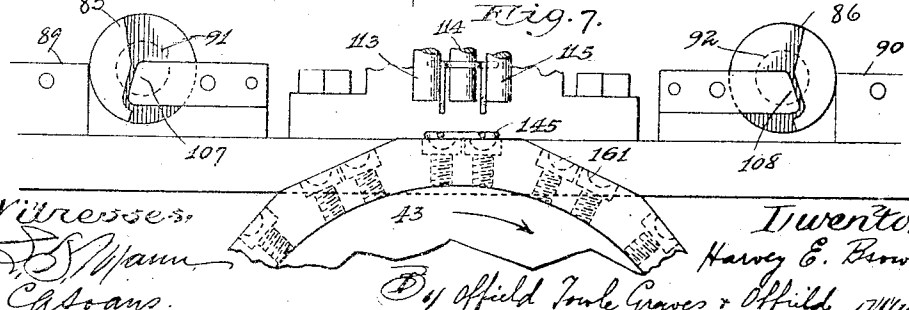


Fig. 7.



Witnesses:

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Fig. 8.

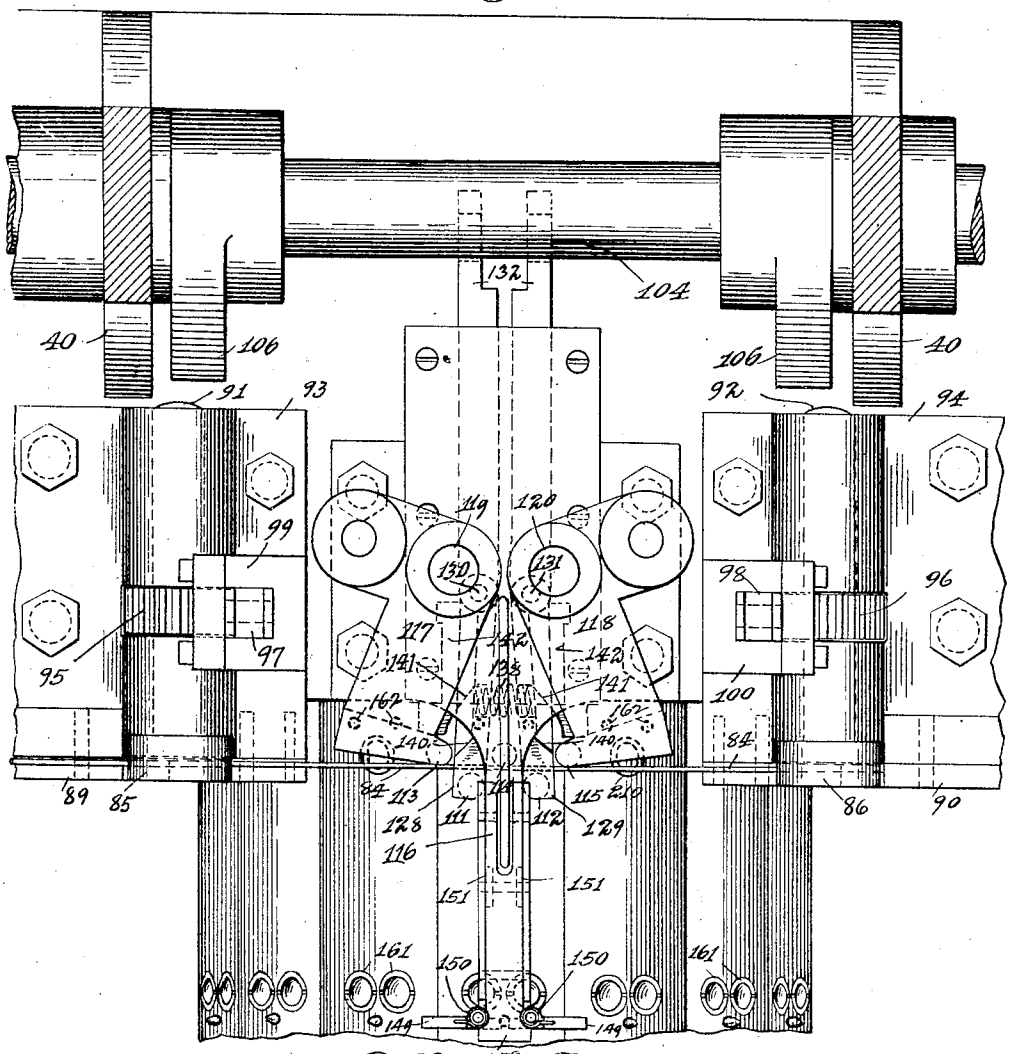
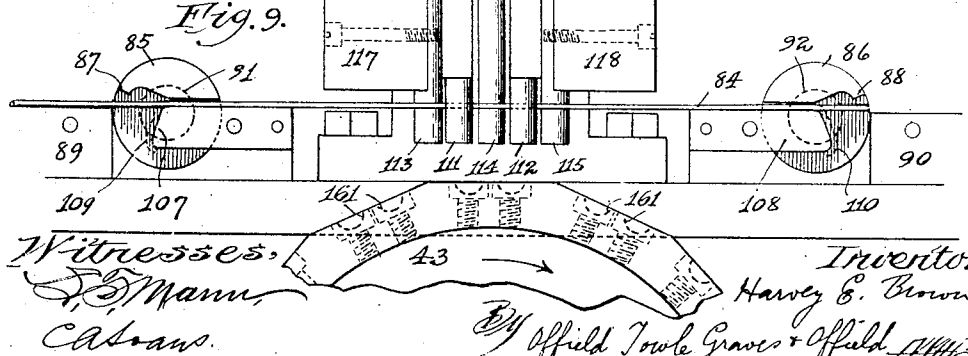


Fig. 9.



Witnesses,

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11 SHEETS—SHEET 6.

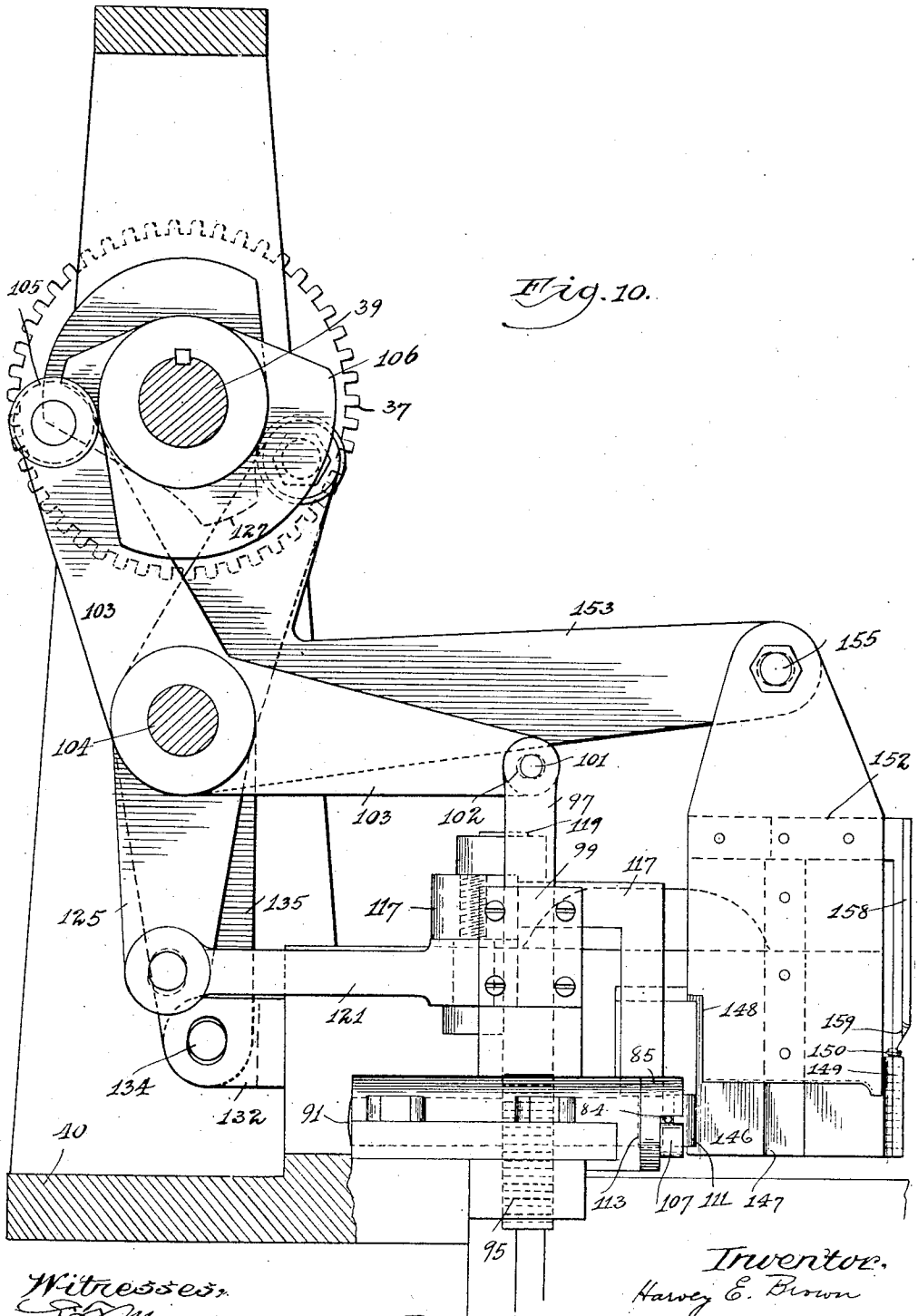


Fig. 10.

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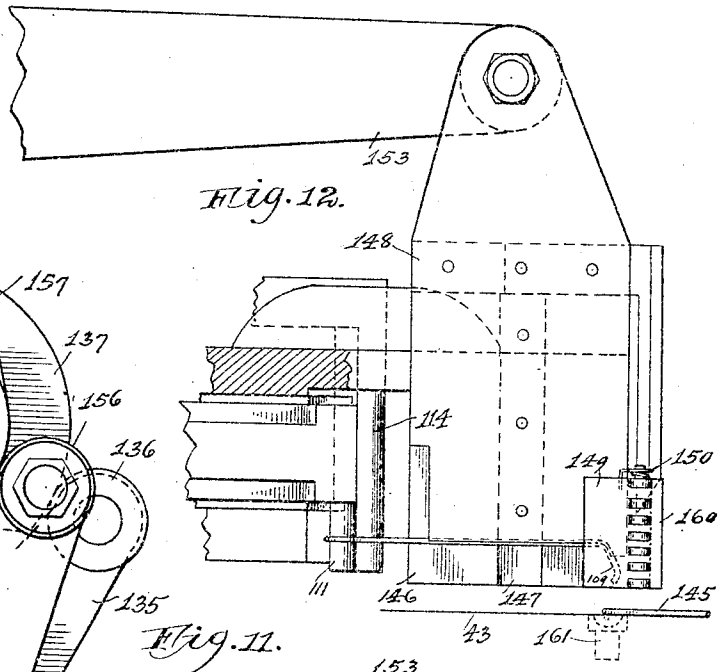


Fig. 12.

Fig. 11.

Witnesses,

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11 SHEETS—SHEET 8.

Fig. 13.

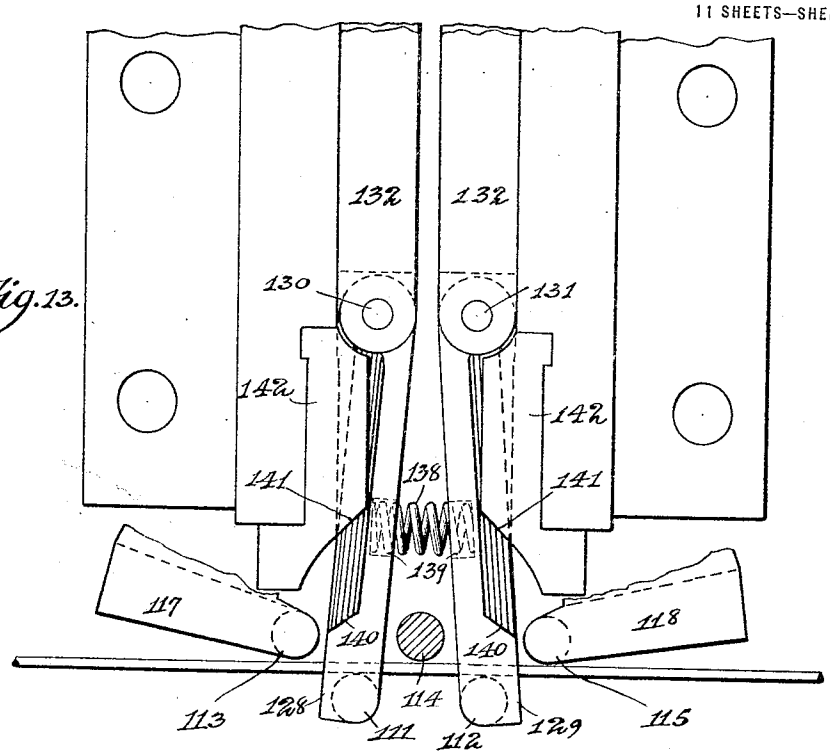
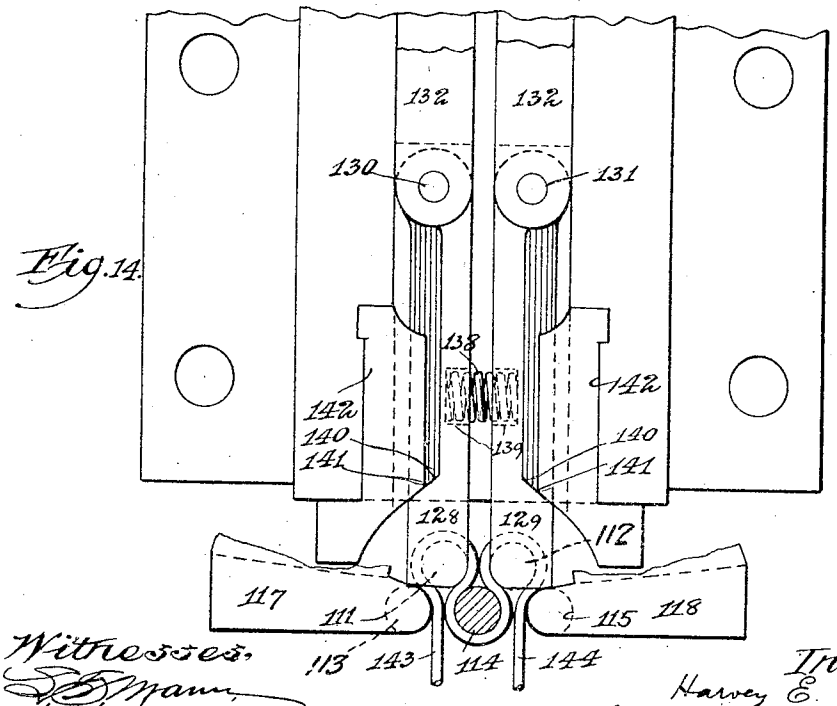


Fig. 14.



Witnesses,

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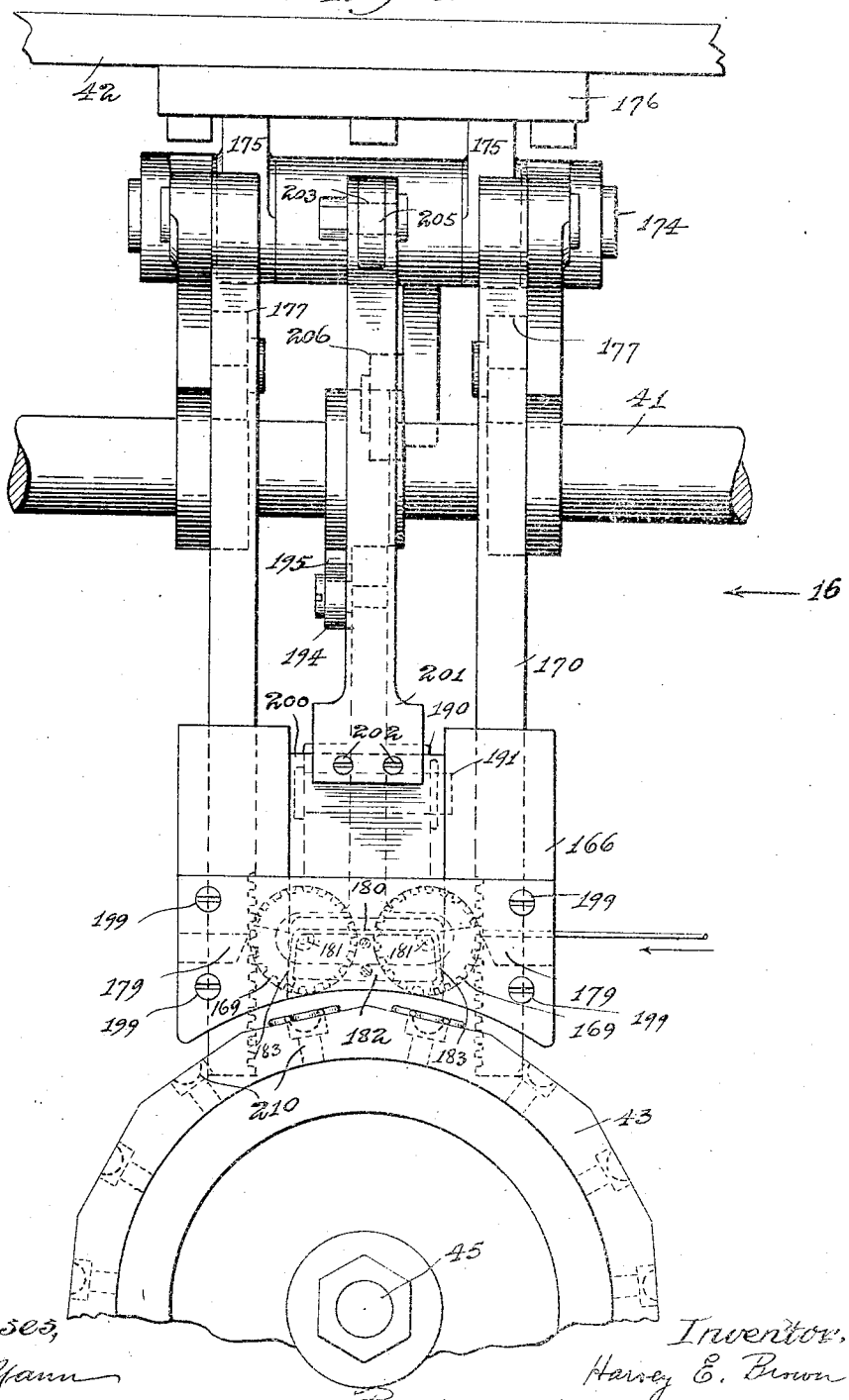
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11 SHEETS—SHEET 9.

Fig. 15.



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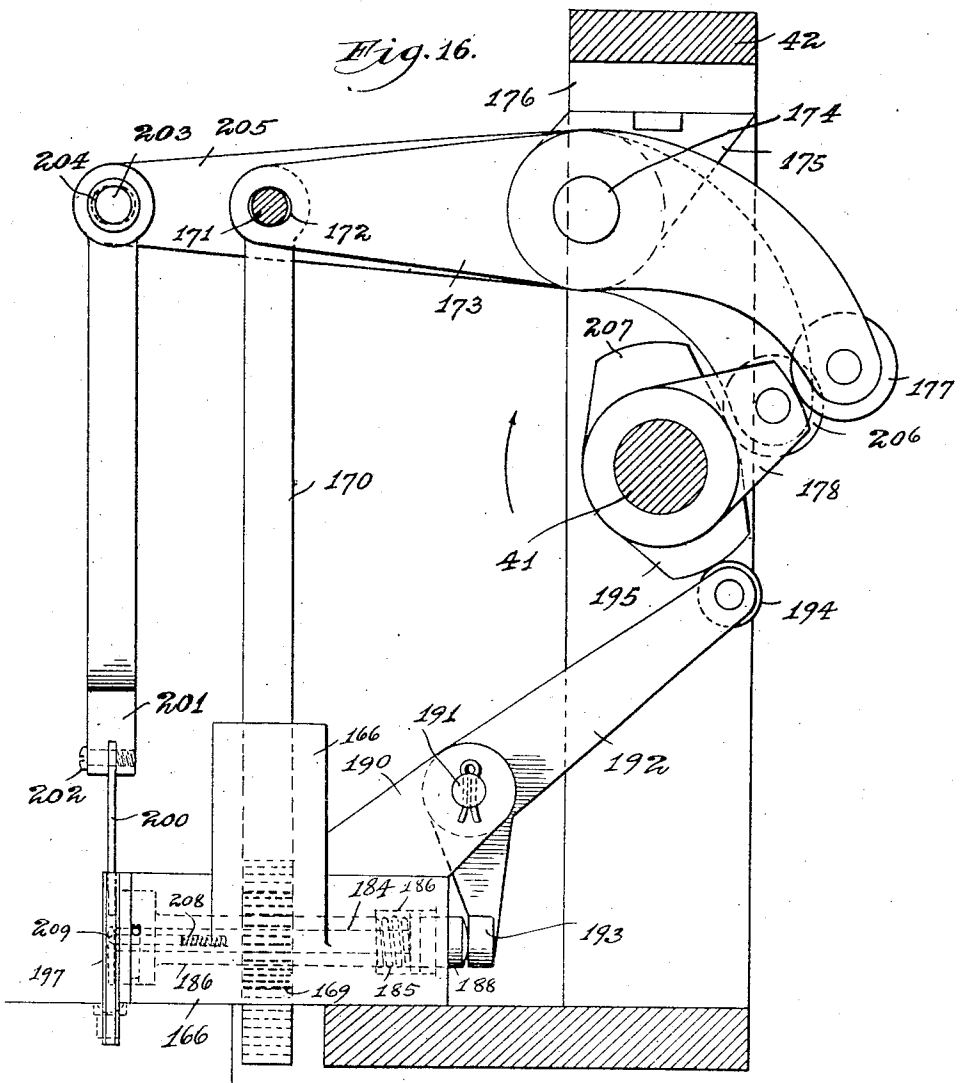
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Fig. 16.



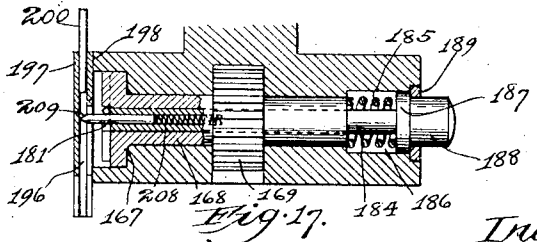


Fig. 17.

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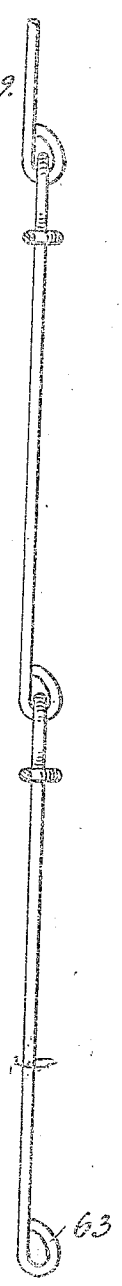
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11 SHEETS—SHEET 11.

Fig. 19.



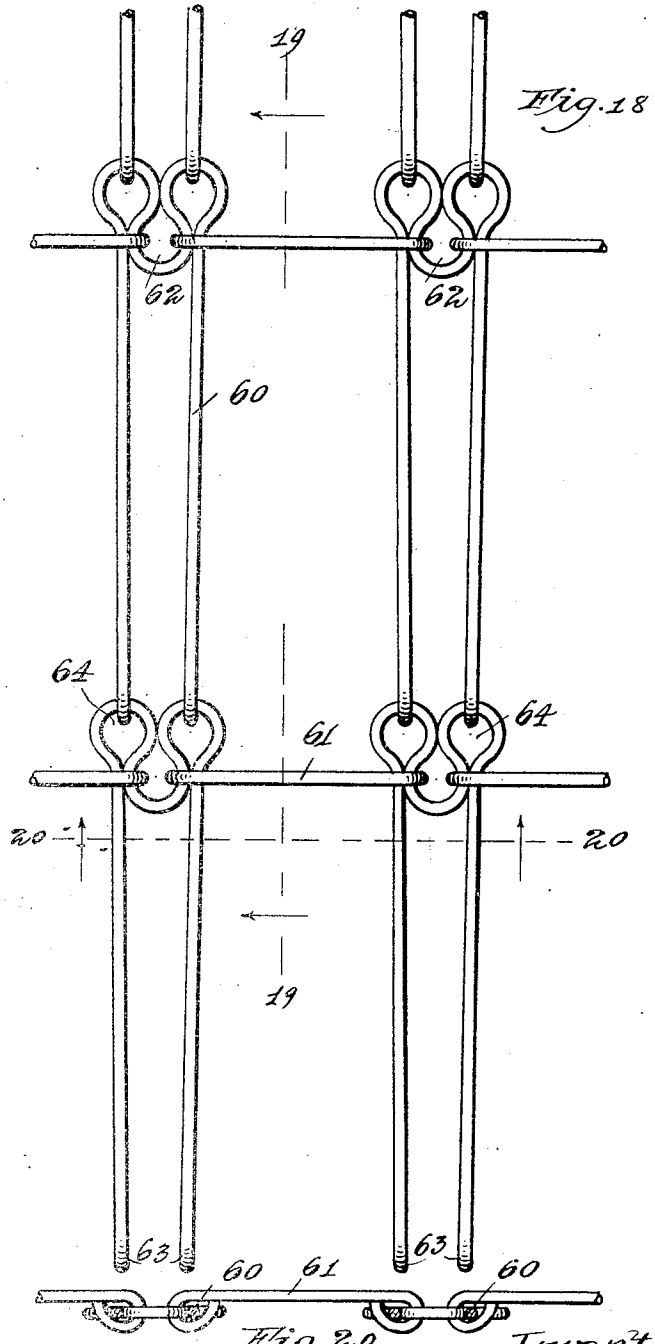


Fig. 18

Fig. 20

Witnesses,

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UNITED STATES PATENT OFFICE.

HARVEY E. BROWN, OF ST. LOUIS, MISSOURI, ASSIGNOR TO SIMMONS COMPANY, OF KENOSHA, WISCONSIN, A CORPORATION OF DELAWARE.

FABRIC-MAKING MACHINE.

1,336,343. Specification of Letters Patent. Patented Apr. 6, 1920.

Application filed June 17, 1916. Serial No. 104,164.

To all whom it may concern:

Be it known that I, HARVEY E. BROWN, a citizen of the United States, residing at St. Louis, State of Missouri, have invented certain new and useful Improvements in Fabric-Making Machines, of which the following is a specification.

My invention relates to improvements in fabric making machines, and is particularly well adapted for application to machines for making wire fabric rapidly and automatically from a continuous length or lengths of metallic wire.

Among the salient objects of the invention, are to provide a machine of the class described which is well fitted for manufacturing rapidly and economically wire fabrics such as are used for bed bottoms; to provide a machine which utilizes a plurality of continuous wire supplies for the purpose of constructing different classes of wire units composing the fabric; to provide a machine for making wire fabric having longitudinal and transverse links in which the finished fabric is fed transversely past the fabric unit-applying mechanisms; to provide a machine of the class described in which the longitudinal fabric units are first connected to the fabric and subsequently the transverse units; to provide a machine for making rectangular mesh fabric in which the finished fabric is progressively fed past the fabric unit-applying mechanisms which include means for completing each mesh for the fabric by two distinct fabric unit-applying operations; to provide a machine of the type last described in which the fabric is fed past the fabric unit-applying mechanisms in one direction only; to provide a machine of the class described which shall be capable of making fabric of indefinite length; to provide a machine of the class described and operating on the spiral principle; to provide an improved method of constructing mesh fabric of the class described; to provide a construction which shall be simple and economical to produce, while at the same time being inexpensive and efficient to operate and maintain; and, in general, to provide an improved machine of the class described.

In the drawings, which illustrate as an application of my invention a machine for manufacturing rectangular-mesh wire bed fabrics—

Figure 1 is a front elevation of the machine;

Fig. 2 is a side elevation, looking from the left of Fig. 1;

Fig. 3 is a view of a portion of Fig. 2, certain portions being broken away to disclose the construction, and certain parts being omitted for the sake of clearness;

Fig. 4 is a section taken on the line 4—4 of Fig. 3;

Fig. 5 is a section taken on the line 5—5 of Fig. 3;

Fig. 6 is a tilted plan view of a portion of Fig. 1, looking in the direction of the arrow 6;

Fig. 7 is a fragmentary view, looking from the bottom of Fig. 6;

Fig. 8 is a view similar to Fig. 6, certain parts being removed for the sake of clearness;

Fig. 9 is a view, looking from the bottom of Fig. 8;

Fig. 10 is a view looking from the left of Fig. 6;

Fig. 11 is a view of the lower portion of Fig. 10, certain parts being sectionalized to show the mechanical construction;

Fig. 12 is a view of a portion of Fig. 11, showing certain parts in another position:

Fig. 13 is a fragmentary view of a portion of Fig. 8, certain parts being removed;

Fig. 14 is a view similar to Fig. 13, but showing certain parts in a different position:

Fig. 15 is an enlargement of a portion of Fig. 1, showing the stapling mechanism;

Fig. 16 is a fragmentary side elevation of the mechanism shown in Fig. 15, looking in the direction 16 of Fig. 15;

Fig. 17 is a fragmentary section of a portion of Fig. 16;

Fig. 18 is a plan view of a portion of the fabric which the particular machine illustrated is adapted to manufacture;

Fig. 19 is a section taken on the line 19—19 of Fig. 18; and

Fig. 20 is a section taken on the line 20—20 of Fig. 18.

The base of the machine is a hollow cast iron standard 30 formed with a surrounding bottom flange 31 to prevent the machine from tipping over, and having at the back an upwardly projecting integral bracket portion 32, the upper end 33 of which forms

a journal bearing for the main shaft 34 of the machine. Said main shaft 34 is driven continuously by means of power applied to the fly wheel or driving pulley 35 by a belt driven by power and running at a suitable rate of speed. On the front end of said driving shaft 34 is keyed a bevel gear 36 which drives the mechanisms for respectively forming and assembling the longitudinal links and the cross-links through bevel gears 37 and 38. The bevel gear 37 is keyed to the end of an inclined shaft 39 which is journaled in a frame designated as a whole 40 carrying the longitudinal link forming and assembling mechanisms; and the bevel gear 38 is keyed to the end of a similarly arranged inclined shaft 41 which drives the stapling or cross-link forming and connecting mechanisms and is journaled in a frame designated as a whole 42. The said frames 40 and 42 are suitably bolted or otherwise secured to the top of the foundation standard 30.

The fabric while being manufactured by the machine is formed in a continuous spiral and is supported and progressively advanced by an intermittently rotated drum or barrel 43. This is accomplished by establishing a fabric loop which hangs down loosely for a considerable distance below the drum so as to enable the spiral to shift its position longitudinally of the drum while the fabric is making a complete revolution on its axis. During such rotation, the drum, of course, turns considerably more than a single revolution. In this respect my machine is somewhat similar to the machine described in United States Letters Patent to Gail, No. 967,011, patented August 9, 1910, and in my United States Patent No. 1,224,270, dated May 1, 1917. It will be found, however, that my machine is substantially different in principle from that described in the patents referred to, since I form the fabric with longitudinal links parallel to the axis of the rotatable drum or fabric support and with the cross-links tangential to the drum; whereas, the patented machine referred to receives the longitudinal links in the form of a continuous chain tangential to the drum and simply applies the cross links or staples to adjacent spirals of said longitudinal chain.

Describing the drum-rotating mechanism and referring to Figs. 2, 3, 4, and 5, the drum or fabric support 43 is securely keyed to the reduced end 44 of a shaft 45 journaled horizontally in the head of the main casting 30, and having its axis parallel with the axis of the shaft 34. Keyed to the shaft 34 between the fly wheel 35 and the bearing 33 is an eccentric 46 which coöperates with the bearing roller 47 carried at the top of a cross head 48 which slides in a pair of opposed guides 49 and 50 clamped onto the rear end of the part 33 by means of suitable bolts, as at 51. The rear end of the shaft 45 projects through beyond the rear of the frame of the machine and carries at its outer end a fixed collar 52. Journaled upon the shaft 45 inside the collar 52 is a pivoted arm 53 the end of which is pivotally connected to the cross head 48 by means of a connecting rod 54. Upon the arm 53 is pivoted a dog 55 which is adapted to engage the teeth of a ratchet wheel 56 keyed to the end of the shaft 45 adjacent the pivoted arm 53. It will be apparent that when the shaft 34 revolves, the cam-shaped eccentric 46 will cause on intermittent up and down movement of the cross head 48 and a resulting intermittent rotation of the ratchet wheel 56 and drum 43. Retrogade movements of the drum 43 are prevented by means of a second dog 57 pivoted at the front of the main casting on a pin 58, and which coöperates with a series of ratchet teeth 59 formed on the circumference of the inner end of said drum 43.

The particular type of fabric which the machine herein described is arranged to manufacture is shown in Figs. 18, 19, and 20. In said figures, 60 are the longitudinal links of the fabric and 61 are the staples or cross links which engage in the central eyes 62 formed in the ends of the longitudinal links 60. The longitudinal links are connected together serially in the form of chains by means of duplicate hook portions 63 which engage in symmetrically arranged eyes 64 of the adjacent longitudinal links. A similar fabric is described in United States patent to Coopersmith, No. 1,044,627, patented November 19, 1912.

Describing that part of the mechanism which is used for forming and assembling the longitudinal links of the fabric, the lower end of the inclined frame 40 is extended as at 65 to form a brace for a stationary rod 66, the ends of which are supported in lugs or blocks 67 and 68 carried respectively by the parts 65 and 40. The projecting member 69 on the lower end of the extension 65 carries at its extreme end a wire-straightening device designated as a whole 70, which may be of any usual or well known construction. The continuous wire which is paid-out from a reel (not shown) is drawn through the wire-straightener 70 by the mechanism driven from the lower end of the shaft 39. This mechanism includes a bevel gear 71 keyed to the lower end of said shaft 39 and which drives a bevel gear 72 mounted upon a short shaft 73 journaled in a lug or lugs 74 formed as integral parts of the inclined frame 40. On a small bracket 75 bolted to the top member of the frame 40 is pivoted the upper end of an arm 76, slotted as at 77, in order to accommodate the crank pin 78 rigidly secured on the rear

face of the bevel wheel 72. The lower end of the slotted arm 76 is connected by means of a pivoted link 79 with a block 80 which slides upon the stationary rod 66. As the shaft 39 is rotated, the block 80 reciprocates upon the guide rod 66 and the wire is advanced into the forming mechanism by means of a pivoted dog 81 which is pressed by a suitable spring as at 82 toward a gripping face on said block 80 which supports the wire. The wire is guided into the forming mechanism by passing through an aperture in the stationary guide lug 83 adjacent the forming mechanism.

Referring to Figs. 8 and 9, 84 represents the end of the continuous wire as it is fed into the machine by the wire-feeding mechanism just described. Before being formed into a unit, the length of wire is severed from the end of the continuous wire supply by means of a pair of symmetrically arranged rotary shearing knives or punches 85 and 86. Said rotary shears have cutting edges 87 and 88 which coöperate with stationary shear blocks 89 and 90 securely fixed upon the lower part of the frame 40. The rotary shear blades 85 and 86 are keyed to the ends of a pair of parallel shafts 91 and 92 journaled in small brackets 93 and 94 clamped to the bottom part of the frame 40, and which are revolved to operate the shear blades by means of a pair of gears 95 and 96 which are keyed to said shafts 91 and 92 and are driven by reciprocable racks 97 and 98 slidably arranged in stationary box guides 99 and 100. In the upper ends of said rack rods 97 and 98 are secured pins 101 which engage in apertures 102 in the ends of the horizontal arms of a pair of bell-crank levers 103 pivoted upon a shaft 104 fixed in the bracket 40 below and parallel with the shaft 39. The upper ends of said bell-cranks 103 carry pivoted rollers 105 which coöperate with a pair of cams 106 keyed to the shaft 39. In order to prevent cramping of the rack rods 97 and 98 in their slide boxes 99 and 100, the apertures 102 in the ends of the bell-cranks 103 are slotted out slightly, as shown in Fig. 10.

The mechanism just described cuts off from the end of the continuous wire supply a length of wire of the required length to make one of the longitudinal fabric units. This occurs when the cam 106, as it rotates with the shaft 39, engages the cam roll 105 and pulls up the rack rods, thus rotating the rotary shear members 85 and 86 which sever the wire. The rotary shear member 86 is employed to cut off the end of the wire in case the wire-feeding mechanism delivers an excessive length of wire, and so insures that each of the wire units shall be precisely the same length. The rotary shear members 85 and 86 also constitute formers to impart a preliminary or inchoate hook shape to the ends of the wire unit 84. To this end, the shear members are made with their cutting faces of suitable contour to coöperate with a pair of stationary forming blocks 107 and 108 against which the ends of the wire are formed when the rotary shear members 85 and 86 are rotated to their limit of movement. The shape of said inchoate hook portions is indicated at 109 and 110 in dotted lines.

After the wire lengths 84 have had their ends formed into preliminary hook shape, the central portion of the link is bent or shaped to form the three eyes at the end of the link and to fold the link centrally upon itself so as to position its limbs parallel with the axis of the fabric drum. To this end I provide the following mechanism: Referring to Figs. 8 and 9, it will be observed that the wire length 84 is fed into the machine behind the forming pins 111 and 112 and in front of the forming pins 113, 114, and 115. The forming pin 114 is at all times stationary and is fixed in a centrally arranged bracket 116 carried by the frame 40, and which bracket projects from said frame a short distance over the fabric drum 43. The forming pins 113 and 115 are carried on the ends of a pair of symmetrically arranged bell-cranks 117 and 118 which are rotatably mounted upon stationary pins 119 and 120. Said bell-cranks 117 and 118 are capable of a rocking movement on the pins 119 and 120 and are actuated by a pair of symmetrically arranged links 121 and 122, the rear ends of which carry pins 123 engaged by elongated apertures 124 in the ends of a pair of symmetrically arranged cam levers 125 rotatably mounted upon the stationary shaft 104. The upper ends of said levers 125 carry cam rollers 126 which coöperate with a pair of cams 127 keyed to the shaft 39. The pins 111 and 112 are carried by the ends of a pair of fingers 128 and 129 which are pivoted at 130 and 131 on the ends of a pair of links 132. The rear ends of said links 132 are slotted as at 133 to admit opposite ends of a pin 134 carried by the lower end of a lever 135 pivotally mounted upon the shaft 104. The upper end of said lever 135 carries a cam roll 136 which coöperates with a cam 137 keyed to a shaft 39. The fingers 128 and 129 are normally forced apart by means of a coil compression spring 138 seated in opposed recesses 139 in the adjacent faces of said fingers, and the opposite outer sides of said fingers are beveled, as shown at 140, in order to coöperate with a pair of cam surfaces as at 141 formed on the inner adjacent corners of a pair of blocks 142 symmetrically arranged on the outside of said fingers.

The operation of the above mechanism is as follows: Referring to Fig. 13, the wire unit, after being fed in and cut off, occupies the position shown, with the pins 113

and 115 spread apart on the ends of the bell-cranks 117 and 118. After the rotary shear blades 85 and 86 have completed their movement, the cam 137 engages the cam roller 136 carried by the lever 135, and the links 132 draw back the fingers 128 and 129, thereby bending the wire around the pins 111 and 112 and pulling the bent portions between the pins 113 and 114 and the pins 114 and 115. During this operation the spring 138 keeps the pins 111 and 112 apart until the bevel portions 140 strike the cam surfaces 141, whereupon the fingers carrying said pins 111 and 112 are brought together into the position shown in Fig. 14. While this is occurring, the cams 127 have engaged the cam rollers 126 and actuated the bell-cranks 125 to cause the links 121 and 122 to push down upon the bell-cranks 117 and 118, thus rocking them and forcing the pins 113 and 115 into the position shown in Fig. 14, the eye portion of the link thus being fully formed.

By reason of the forming operations just described, the limbs 143 and 144 have been caused to occupy a position parallel to each other and to the axis of the fabric drum, as shown in Figs. 6 and 14. The next operation is to connect said link to the previously formed link 145 on the end of the finished fabric portions carried by the drum. Referring to Figs. 6, 8, 10, 11, and 12, the stationary bracket member 116 extends out over the fabric-supporting drum 43, and on the projecting end is formed a rectangular depending plate or block 146, the opposite sides of which are grooved out, as shown at 147, in order to furnish guides for a pair of plunger plates 148 arranged on either side of said rectangular block 146. The width of said guide block 146 is substantially equal to the spacing between the parallel limbs of the longitudinal fabric units 60, as shown in Fig. 6, and is so located that when the unit is folded by the eye-forming mechanism, said limbs of the unit lie against the opposite sides of said block 146 (see Fig. 11). In order to securely hold the ends of the unit limbs against the guide block 146, I mount on the outer end of the guide block 146 a pair of oppositely disposed symmetrically arranged hinged plates 149 which are arranged to swing in opposite directions over the hooked ends of the unit and so hold the same securely against the sides of the block 146. Normally, said hinged plates 149 are directed into the position shown in Fig. 8 by means of a pair of coil springs 150. The plunger blades 148, which are approximately the same thickness as the diameter of the wire of which the unit is formed, have secured to their inner faces longitudinally arranged flat plates 151 which slide in the grooves 147 and so maintain said plunger plates 148 in alinement. Said plunger plates 148, above the top of the guide block 146, are connected by means of an interposed cross bar or filling member 152 (see Fig. 11), which is of the same thickness as the guide block 146 and thus holds the plunger plates the proper distance apart. The plunger plates 148 are actuated by means of a bell-crank lever 153 in the end of which is a slot 154 adapted to receive a pin or bolt 155 connecting the upper ends of the plunger plates 148. Said bell-crank 153 is rotatably mounted upon the stationary shaft 104 and the vertical limb of the crank carries a cam roller 156 which coöperates with a cam 157 keyed to the shaft 39. On the outer end of the cross piece 152 is formed at right angles a narrow pointed bar 158, the lower bevel end 159 of which normally is positioned above the tops of the hinged plates 149. The function of said pointed bar 158 is to close the swinging hinged plates 149 upon the hooked ends of the unit when the plunger plates 148 are caused to descend by the bell crank 153. This is effected by reason of the pointed end 159 of said bar 158 entering behind the rear ends 160 of said hinged plates and thus wedging them apart. The width of the bar 158 across its outermost portion is such (see Fig. 6) that when the parallel portion of the bar 158 enters between the parts 160, the hinged plates 149 assume the position shown in Fig. 6.

The plunger plates 148 are for the purpose of projecting the unit from off the forming pins 113, 111, 114, 112, and 115 and the block 146, and for engaging the formed unit with the previously connected unit 145, Fig. 12 showing the plunger plates in the act of ejecting the unit. In order to complete the formation of the hooks 109 and at the same time connect same with the eyes of the previously connected fabric unit 145, I insert in the periphery of the fabric-supporting drum 43 a series of pairs of threaded studs 161, the outer ends of which are rounded or hollowed out, so that when the plunger plates 148 force the hooks of the unit out from between the plates 149 and the guide block 146, the ends of the hooks on said unit enter the eyes of the unit 145 and are forced against the rounded hollowed out surface of said forming studs 161, thereby causing the incomplete hook shape of the unit to assume the final hook shape, as shown in Fig. 19. After the units have thus been completely formed and connected to the ends of the previously assembled units, they are held in position on the drum by means of a series of pointed pins 162 fixed in the periphery of the fabric-supporting drum.

The operation of the cross-link forming and connecting mechanism is in some respects like that of the mechanism for form-

ing and assembling the longitudinal links. It should be understood of course that the fabric-supporting drum rotates in the direction of the arrow 163 (see Fig. 1) so that the longitudinal links are first connected to the fabric and disposed on the drum with their eye ends disconnected from each other, said eye ends of the longitudinal limbs being subsequently stapled or connected together by means of the cross-links which are applied by means of the cross-link forming and connecting mechanism after the fabric drum has been stepped forward 90°, approximately.

The staple forming and connecting mechanism comprises a wire-straightening arrangement 164 and a reciprocating wire-feeding block 165, similar to the parts 70 and 80 of the longitudinal link forming mechanism and having the same functions. Mounted on the lower part of the frame 42 are a pair of symmetrically arranged housings 166 (see Figs. 15, 16 and 17); in each of these housings there is journaled a rotary shearing head 167 carried on the end of a shaft 168, said shaft 168 being rotated by means of a pinion 169 keyed thereto and operated by means of a rack rod 170. In the upper end of said rack rod 170 is fixed a pin 171 which enters a slot 172 in one end of the lever 173 rotatably mounted upon a fixed shaft 174 which is carried by a pair of lugs 175 on a bracket 176 secured to the top member of the frame 42. The other end of said lever carries a cam roll 177 which coöperates with a cam 178 keyed to the constantly rotating shaft 41. The cutting edge of each of the rotary shearing elements 167 coöperates with a stationary shear block 179 over which the wire is fed by the reciprocating wire-feeding mechanism, and the width of the cutting edge of said rotary shear element 167 in a direction along the axis of rotation is equal to or slightly greater than the diameter of the wire (see Fig. 17). After the wire is cut off by the rotation of the shears, the latter continue their movement and bend the ends of the cross-links 180 over a pair of centrally arranged forming pins 181. The working surfaces of the shearing elements 167 are also suitably shaped to coöperate with a central stationary forming block 182 upon which the wire is bent, thus forming the ends of the cross-links into incomplete or preliminary hook shape, as shown at 183. In order to discharge the cross-links thus formed and connect same into the eyes of the longitudinal links, the shaft 168 is made hollow and equipped with a sliding plunger 184 which is normally withdrawn by means of a coil spring 185 contained in an enlargement 186 and coöperating with a fixed collar or shoulder 187 on the end of said plunger pin 184. The outer end of said head 187 is reduced slightly in diameter, as shown at 188, and projects through a hole drilled in the threaded retaining collar 189. In a central upstanding lug 190 formed as part of the casting or bracket comprising the part 166 I rotatably mount upon a fixed shaft 191 a bell-crank lever 192, the lower end of which is formed with a pair of symmetrically arranged fingers or tappets 193 engaging the rounded ends 188 of the plungers 184. The upper end of said bell-crank 192 carries a cam roll 194 coöperating with a cam 195 keyed to the rotating shaft 41.

When the cross link 180 is thrust forward by the plungers 184, it is received in a narrow passage 196 located between a pair of plates 197 and 198 spaced apart substantially the same distance as the diameter of the wire from which the unit is formed and secured to the front faces of the housings 166 by means of screws 199. After having been received in said narrow space 196, the unit is forced out therefrom by means of a thin flat plunger 200 secured in the lower end of a thrust bar 201 by means of screws 202. The upper end of said thrust bar 201 carries a pin 203 working in a slot 204 in the end of a cam lever 205, said cam lever 205 being pivotally mounted upon the fixed shaft 174. The rear end of said cam lever 205 carries a cam roll 206 which coöperates with a cam 207 keyed to the constantly rotating shaft 41. In order to support the formed unit in proper position between the plates 197 and 198, the pins 181 over which the hooked ends of the unit are formed are forced outwardly against the plate 197 by means of coil springs 208 seated in the plungers 184. To prevent the ends of the pins 181 from interfering with the function of the plunger plate 200, the ends of the pins 181 are pointed, as shown at 200, so that the round wire unit resting thereon is enabled to force back the pins slightly to enable the unit to pass as the latter is engaged and moved downwardly by the plunger 200. In order to complete the formation of the hooked ends 183 of the cross link and to connect the eye ends of the longitudinal units securely together, the fabric unit supporting drum is furnished with a series of inserts 210 similar in construction and in function to the inserts 161.

It will be seen that the longitudinal links are successively connected to the end of the fabric between successive step-by-step rotary movements of the drum, and that the adjacent longitudinal units are connected together transversely by the cross-link applying mechanism. It should be noted that in order to permit the spacing of the longitudinal link-forming and applying mechanism and the cross link-applying mechanism, the distance between said mechanisms is equal to the spacing between a plurality

of longitudinal links, this however having no bad effect, for the reason that the longitudinal links are supported in position on the fabric drum until they are stepped around to the cross link-applying mechanism.

The machine is of course capable of modification in order to make it suitable for operating upon fabrics different from the specific fabric selected as an illustration of one embodiment of the machine. For instance, it may be necessary to operate upon fabric having longitudinal links differing greatly in shape from the shape of the longitudinal link set forth herein. Also, if the machine is to operate upon comparatively wide longitudinal links, it may be necessary to employ cross link parts considerably shorter than and different from the cross links described.

The construction described is subject to other modifications without departing from the spirit of the invention, and consequently the scope of the invention must be determined by the appended claims without regard to the specific details of construction described.

I claim—

1. In a machine for making wire fabric, the combination of means for successively attaching fabric units to the edge of a completed fabric portion, means for applying connectors to the adjacent units thus attached, and means for causing relative motion between the said unit-attaching means and the said fabric in a direction substantially parallel to said fabric edge.

2. In a machine for making rectangular mesh fabric, the combination of means for successively attaching spaced-apart fabric units to the edge of a completed fabric portion, means for applying spaced-apart connectors to the adjacent units thus attached, and means for intermittently causing relative motion between the said unit-attaching means and said fabric in a direction substantially parallel to said fabric edge.

3. In a machine for constructing rectangular mesh wire fabric composed of longitudinal and transverse links, the combination of mechanism for advancing a completed fabric length step-by-step in a direction transversely of its length, longitudinal-fabric-unit-applying mechanism arranged adjacent to the edge of said completed fabric portion for applying a series of transversely spaced longitudinal links to the edge of said fabric with their ends projecting therefrom, and means for applying transverse links to the projecting ends of said longitudinal links to complete the meshes of said fabric.

4. In a machine for constructing wire fabric composed of longitudinal and transverse links, the combination of a support for carrying a completed fabric portion, longitudinal-fabric-unit-applying mechanism for applying longitudinal links one at a time to the edge of said fabric portion, means for effecting step-by-step uni-directional transverse movements of said fabric on said support past said longitudinal unit-applying mechanism, and mechanism for applying cross links to the ends of said longitudinal links after the application of the latter to said fabric portion.

5. In a machine for constructing wire fabric, the combination of a support for a previously completed fabric portion, mechanism for directly applying a series of fabric units one at a time to the end of the fabric portion carried on said support, and mechanism for subsequently applying other units to said first units.

6. In a machine for constructing tubular wire fabric, the combination of a rotary fabric support for effecting circumferential movement of a previously completed fabric portion carried by said support, means for applying circumferentially spaced fabric units to said fabric portion, and means for applying connectors between said longitudinal fabric units.

7. In a machine for constructing tubular wire fabric, the combination of a rotary fabric support for effecting circumferential movement of a previously completed fabric portion carried by said support, means for applying circumferentially spaced separate fabric units to said fabric portion, and means for subsequently applying connectors between adjacent spaced longitudinal fabric units.

8. In a machine for making wire fabric, the combination of a support for carrying a completed fabric portion, mechanism for applying longitudinally disposed links, one at a time, to the edge of said completed fabric portion carried by said support, means for effecting relative transverse movement of said fabric unit applying mechanism and the fabric portion, and means for forming connections transversely tying together said longitudinal links.

9. In a machine for making wire fabric, the combination of a support for carrying a completed fabric portion, mechanism for applying longitudinally disposed links, one at a time, to the edge of said completed fabric portion carried by said support, means for effecting relative transverse movement of said fabric unit applying mechanism and the fabric support, and means for forming connections transversely tying together said longitudinal links subsequent to the application of said longitudinal links to the fabric by said fabric unit applying mechanism.

10. A machine for making tubular wire fabric, comprising a rotary fabric support

for effecting circumferential movement of a previously completed fabric portion carried by said support, means for effecting step-by-step movements of said support, means operative during the intervals between successive step-by-step movements to apply circumferentially spaced fabric units to said fabric portion, and means for forming connections tying said fabric units transversely together.

11. In a machine for constructing spirally arranged tubular wire fabric, the combination of a rotary fabric support for effecting successive circumferential uni-directional movements of a previously completed fabric portion carried by said support, means for intermittently moving said support, means for directly engaging longitudinal fabric units, one at a time, with the edge of the fabric portion carried by said support, and means for forming connections transversely tying together said fabric units.

12. In a machine for constructing spirally arranged tubular wire fabric, the combination of a rotary fabric support for effecting successive circumferential uni-directional movements of a previously completed fabric portion carried by said support, means for moving said support, means for forming and directly engaging, one at a time, with the end of said fabric portion a series of circumferentially spaced longitudinally disposed fabric units, and mechanism for contemporaneously forming connections tying together circumferentially a pair of said engaged fabric units.

13. In a machine for constructing spiral tubular wire fabric, the combination of a drum for supporting a previously completed fabric portion, means for effecting step-by-step uni-directional rotary movements of said drum, means for forming and connecting, one by one, serially, to the end of said fabric portion a series of disconnected fabric units having their lengths arranged parallel to the axis of said drum, and cross link applying means for connecting together the outer ends of said longitudinal fabric units.

14. In a machine for constructing wire fabric, the combination of link forming means, means for moving the fabric transversely past said link forming means, means for engaging said links, one at a time, with the edge of said fabric, and means for forming and applying connectors tying together transversely the outer ends of said links.

15. In a machine for making fabric having longitudinal links and transverse connectors therefor, the combination of mechanism for forming and engaging with the edge of a previously completed fabric portion said longitudinal links, one at a time, means for effecting movement of the fabric past the longitudinal link applying means, and a separate mechanism for subsequently applying the connectors to tie together the outer ends of said longitudinal links.

16. In a machine for constructing fabric composed of longitudinal units tied together transversely by connectors, the combination of means for effecting step-by-step transverse uni-directional movements of a previously completed fabric portion, relatively stationary means for forming and engaging with the end of said fabric portion, one by one, a series of longitudinal units, and mechanism spaced apart from the longitudinal fabric engaging means and along the end of said fabric portion for forming the connectors and applying the same to the adjacent longitudinal fabric units.

17. In a machine for making fabric of the class described, the combination of a rotary drum for supporting a previously completed fabric portion, wire-feeding means, means for severing and forming a wire unit into inchoate link shape, means for engaging one end of said link with the edge of said fabric portion and simultaneously completing the formation of said link, and means for subsequently forming and applying a connector tying said link to a similar previously engaged link to form a mesh of said fabric.

18. In a machine for making fabric of the class described, the combination of a fabric support, means for effecting transverse movement of a previously completed fabric portion carried by said support, wire-feeding means, means for severing a unit length of wire from the end of a continuous wire supply, means for forming said wire length and subsequently engaging the edge of the same with the edge of the fabric portion, and means for subsequently applying a transverse connector to said fabric unit and the adjacent previously engaged unit.

19. In a machine for making fabric of the class described, the combination of a fabric support, means for effecting transverse movement of a previously completed fabric portion carried by said support, wire-feeding means, means for severing a unit length of wire from the end of a continuous wire supply, means for forming said wire length and subsequently engaging the edge of the same with the edge of the fabric portion, and synchronized wire-feeding and subsidiary wire-forming and engaging mechanisms for applying a cross link to connect said fabric unit to the previously engaged unit.

20. In a machine for constructing wire fabric, the combination of a drum for supporting a previously completed length of spiral tubular wire fabric, means for effecting step-by-step rotary movements of said drum, means for forming a fabric unit into incomplete hook shape, means for engaging the hook of said unit with the end of the

fabric portion on said drum and locking said unit to said fabric at one end, the fabric drum being arranged to support the connected unit in position with its length substantially parallel to the axis of said drum, and means for applying a cross connector between said unit and a similar unit previously connected to said fabric.

21. In a machine for constructing a web of wire mesh fabric, the combination of means for severing a length of wire from a continuous wire supply, means for forming the end of said wire length to form a fabric-engaging part, means for subsequently engaging said formed end with the end of a unit previously connected to and incorporated into a previously completed portion of said mesh web length, and means for applying connectors transversely tying together units so engaged with said fabric.

22. In a machine for constructing wire fabric, the combination of means for forming a length of wire from a continuous wire supply, means for bending one end of said wire length into incomplete hook shape to form a fabric-engaging portion, means for engaging said hook with the edge of a previously completed fabric length and completing said hook, thereby locking said wire length to the fabric edge and positioning the same longitudinally of the fabric, and means for applying a cross connector between said unit and a previously connected unit transversely adjacent thereto.

23. In a machine for constructing wire fabric, the combination of a drum for supporting a previously completed length of spiral tubular wire link fabric, means for effecting step-by-step rotary movements of the fabric on said drum, means for severing lengths of wire from a continuous wire supply, means for forming said wire length into fabric units each having an eye at one end and an eye-engaging part at the other end, and means synchronized with each step by step movement of said fabric for connecting said eye engaging part of said unit with the eye of a unit-forming part of the previously completed fabric portion.

24. In a machine for constructing wire fabric, the combination of a drum for supporting a previously completed length of spiral tubular wire link fabric, means for effecting step-by-step rotary movements of the fabric on said drum, means for severing lengths of wire from a continuous wire supply, means for forming said wire lengths into fabric units each having an eye at one end and an eye-engaging part at the other end, means synchronized with each step by step movement of the fabric for connecting said eye-engaging part of said unit with the eye of a unit forming part of the previously completed fabric portion, and means for locking said eye-engaging portion in said eye.

25. In a machine for constructing wire fabric, the combination of a drum for supporting a previously completed length of spiral tubular wire link fabric, means for effecting step-by-step rotary movements of said drum, means for severing a length of wire from a continuous wire supply, means for forming said wire length into a fabric unit having an eye at one end and an eye-engaging part at the other end, means for connecting said eye-engaging part of said unit with the eye of a unit forming part of the previously completed fabric portion, and means for locking said eye-engaging portion in said eye, the fabric-supporting drum being arranged to support said unit longitudinally of the drum with its eye remote from the fabric portion.

26. In a machine for constructing wire fabric, the combination of a drum for supporting a previously completed length of spiral tubular wire link fabric, means for effecting step-by-step rotary movements of said drum, means for severing a length of wire from a continuous wire supply, means for forming said wire length into a fabric unit having an eye at one end and an eye-engaging part at the other end, means for connecting said eye-engaging part to said unit with the eye of a unit forming part of the previously completed fabric portion, means for locking said eye-engaging portion in said eye, the fabric-supporting drum being arranged to support said unit longitudinally of the drum with its eye remote from the fabric portion, and means for subsequently applying connectors tying together the eye ends of adjacent units.

27. In a machine for constructing wire fabric, the combination of a drum for supporting a previously completed length of spiral tubular wire link fabric, means for effecting step-by-step rotary movements of said drum, means for severing a length of wire from a continuous wire supply, means for forming said wire length into a fabric unit having an eye at one end and an eye-engaging part at the other end, means for connecting said eye-engaging part of said unit with the end of a unit-forming part of the previously completed fabric portion, means for locking said eye-engaging portion in said eye, the fabric-supporting drum being arranged to support said unit longitudinally of the drum with its eye remote from the fabric portion, and means for applying cross links to the eye ends of transversely adjacent units so connected to said fabric portion.

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