W. M. & C. E. BIRCH.

WIRE FENCE MACHINE.

APPLICATION FILED NOV. 29, 1909.

961,477. Patented June 14, 1910.

7 SHEETS—SHEET 1.

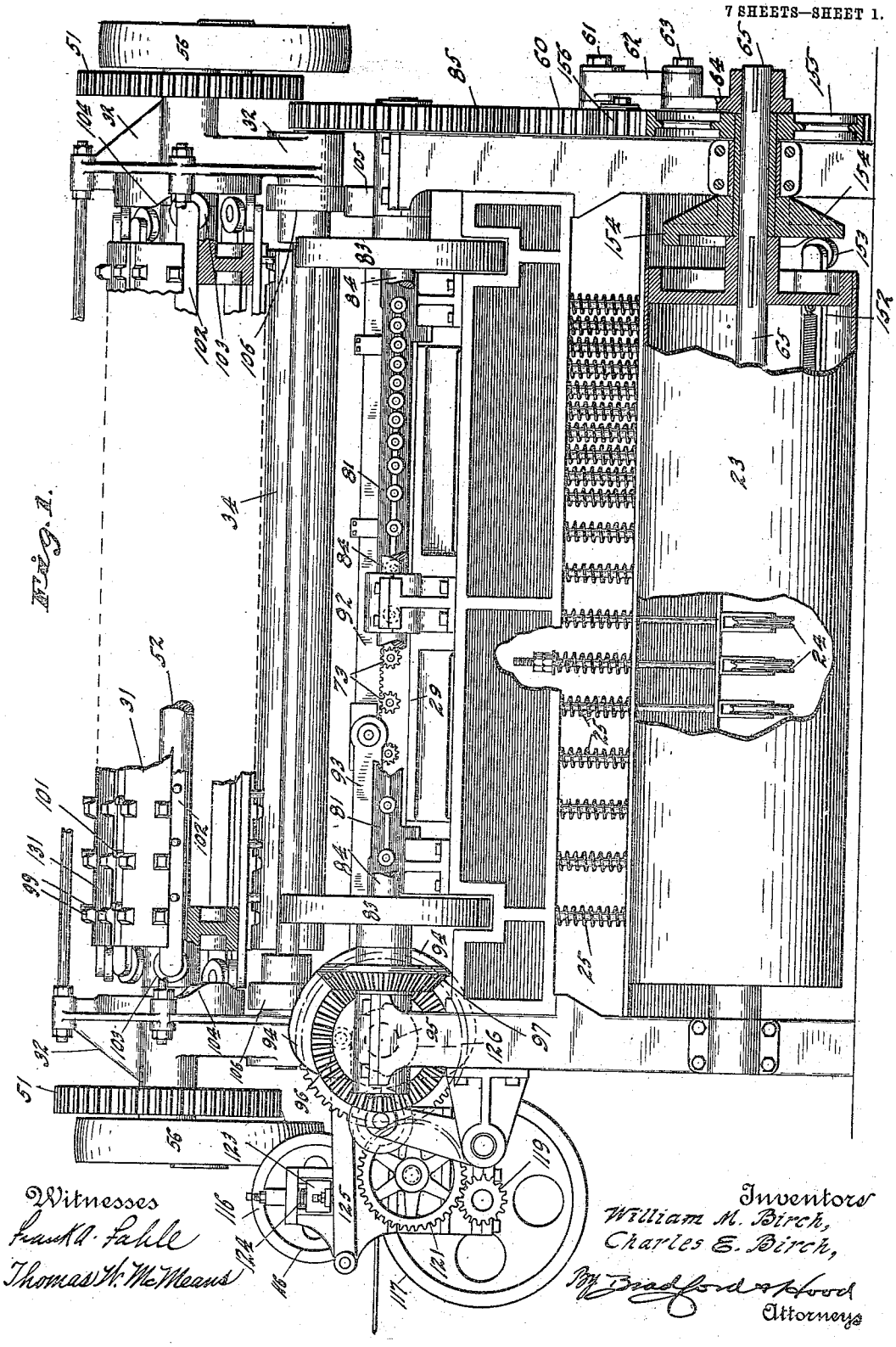

Fig. 1.

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Fig. 2.

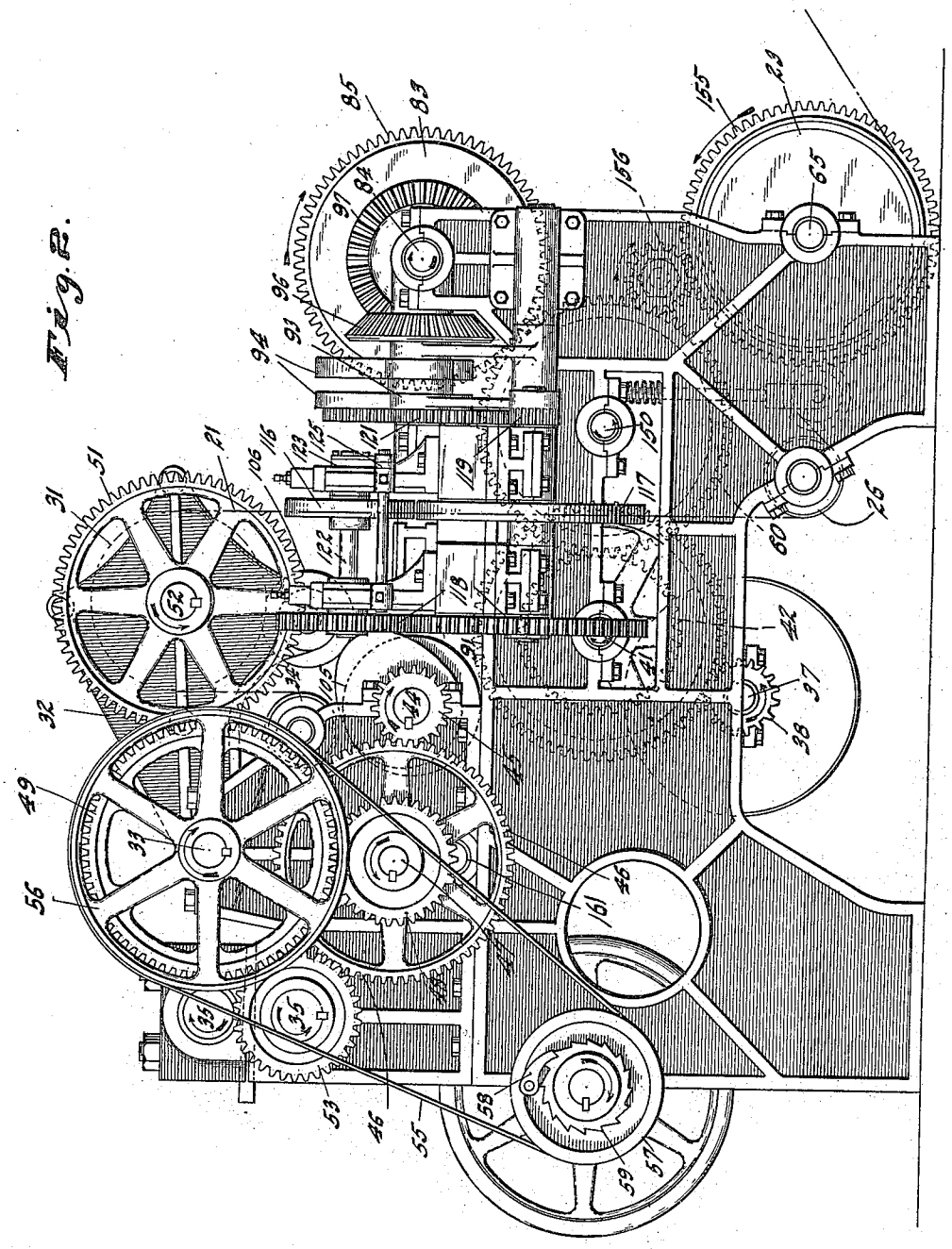

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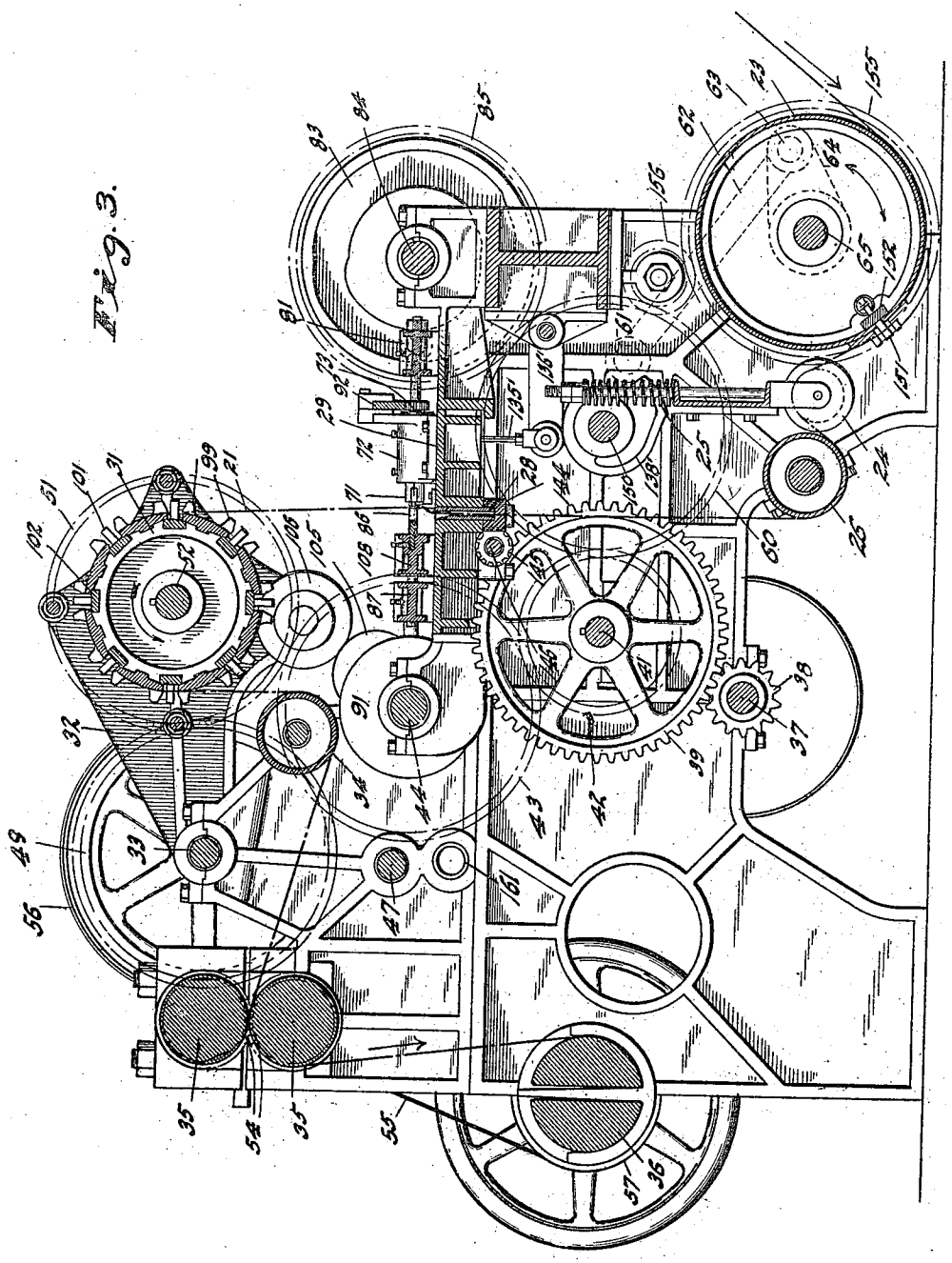
Fig. 3.



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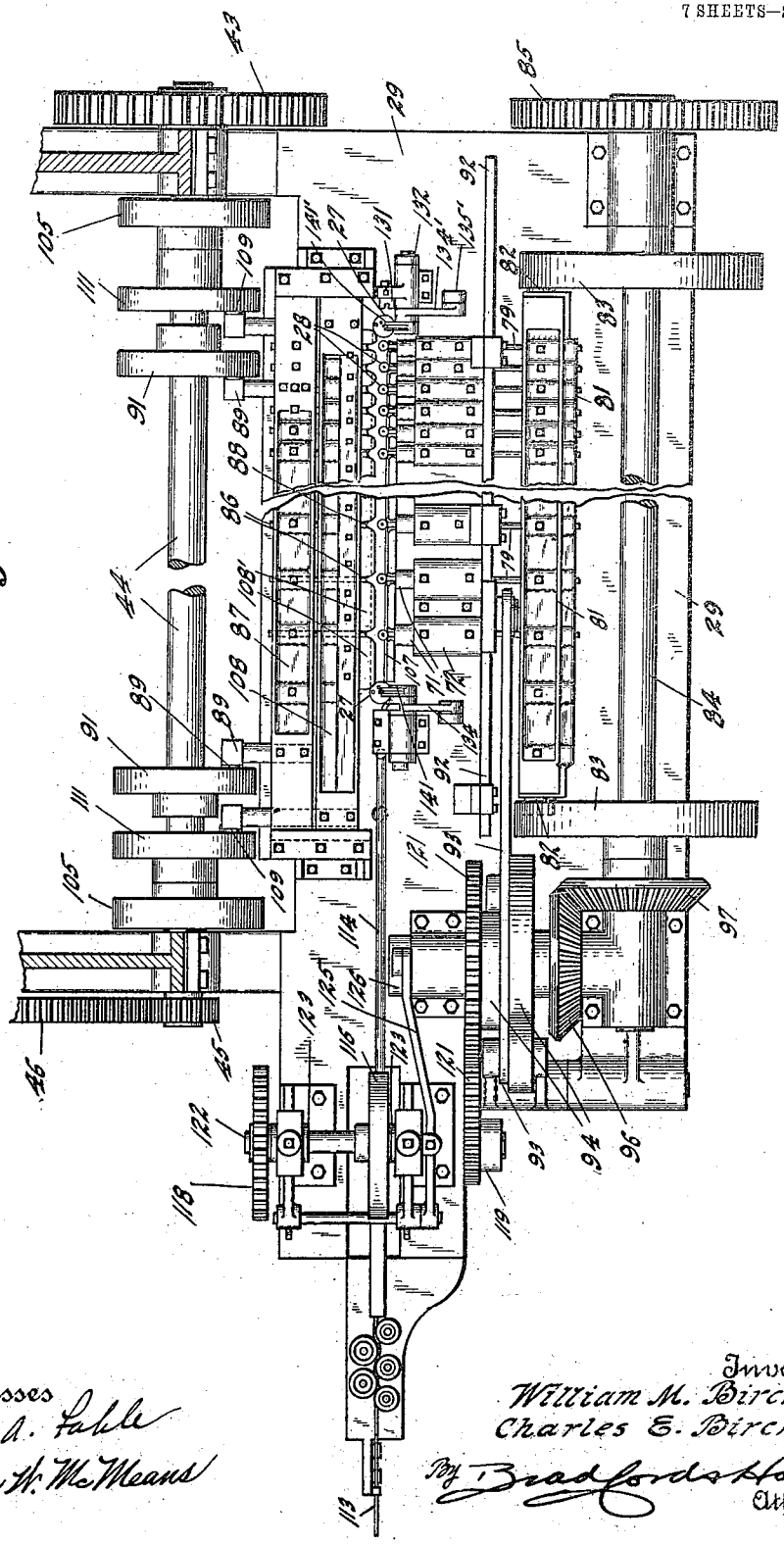

Fig. 4.

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Fig. 5.

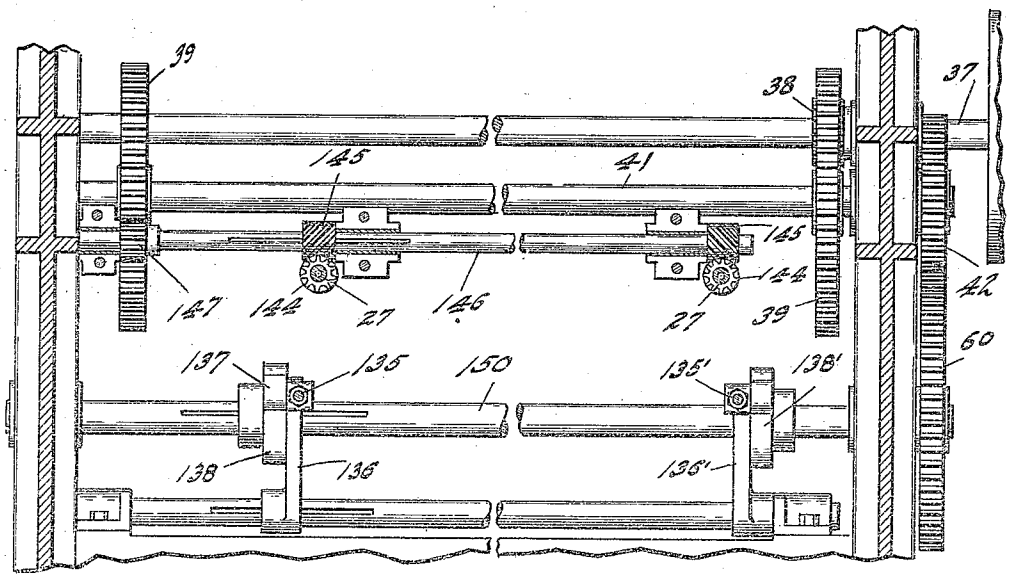

Fig. 6.

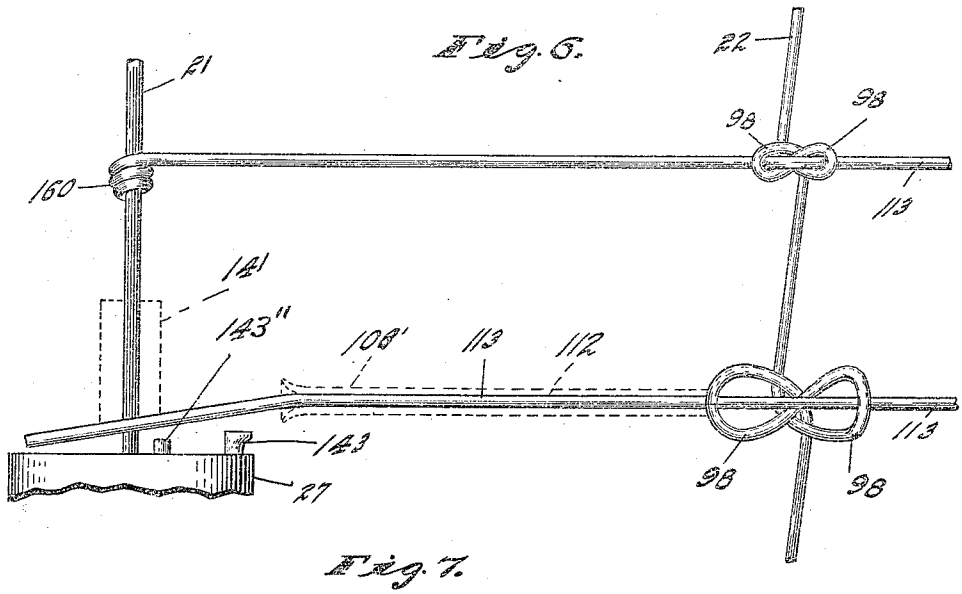

Fig. 7.

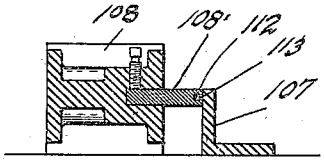

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Fig. 8.

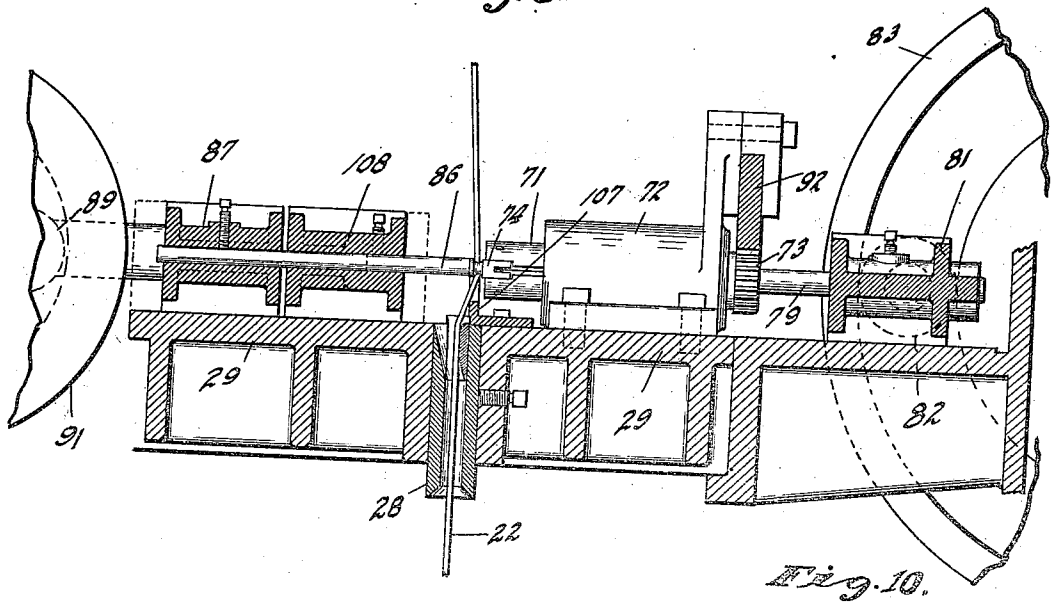


Fig. 10.

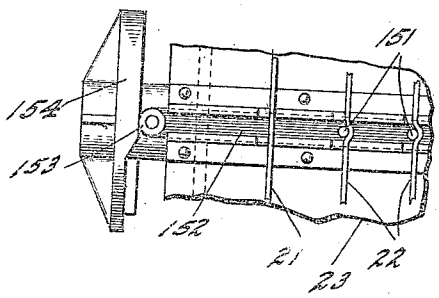
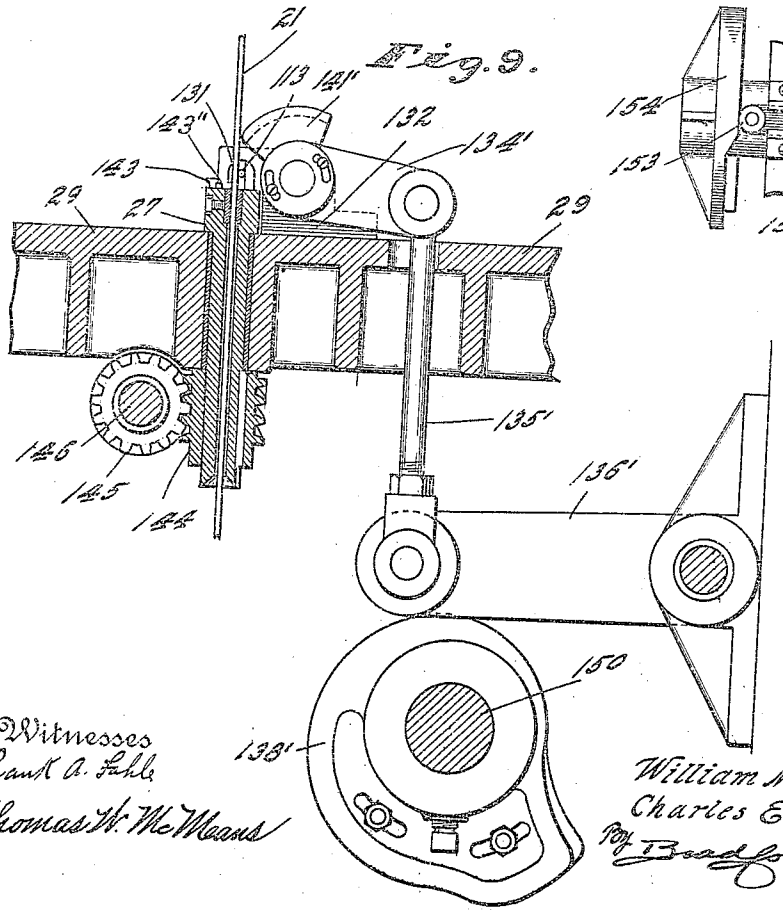


Fig. 9.



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7 SHEETS—SHEET 7.

Fig. 11.

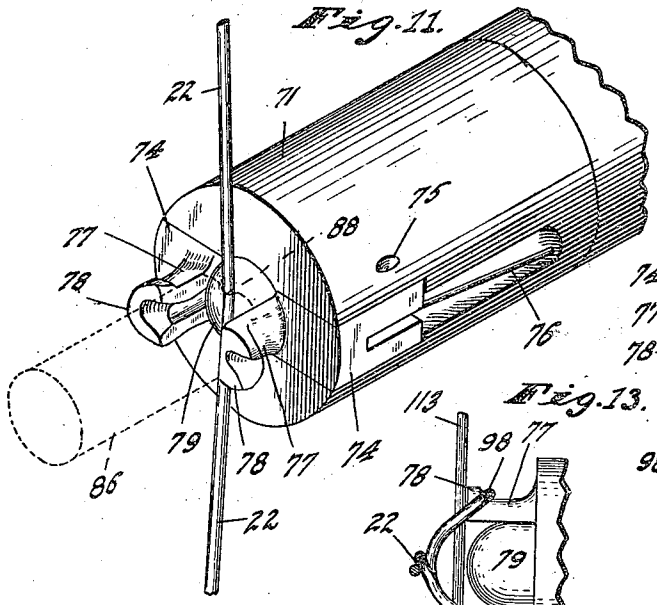


Fig. 12.

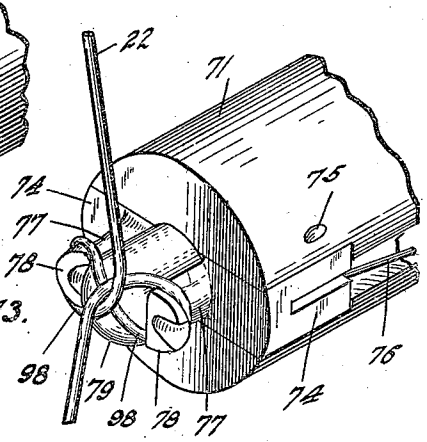


Fig. 13.

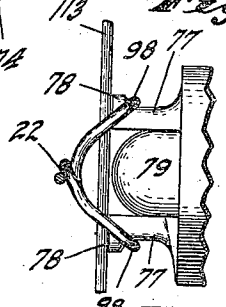


Fig. 14.

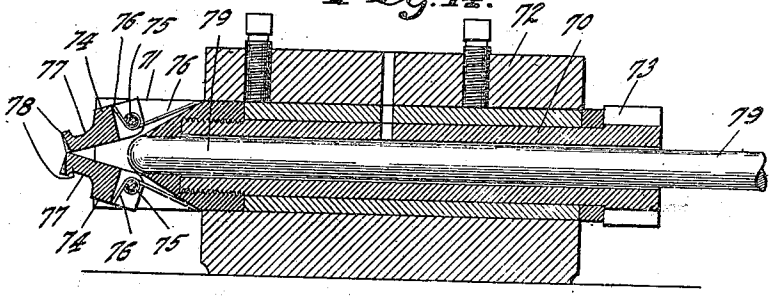


Fig. 15.

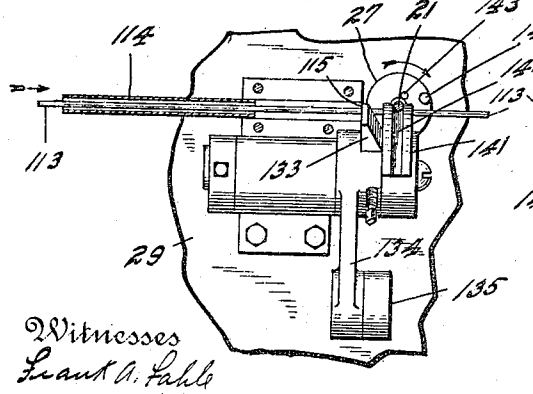
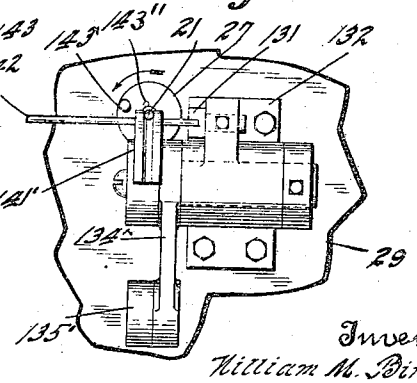


Fig. 16.



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UNITED STATES PATENT OFFICE.

WILLIAM M. BIRCH AND CHARLES E. BIRCH, OF CRAWFORDSVILLE, INDIANA.

WIRE-FENCE MACHINE.

961,477. Specification of Letters Patent. Patented June 14, 1910.

Application filed November 29, 1909. Serial No. 530,410.

To all whom it may concern:

Be it known that we, WILLIAM M. BIRCH and CHARLES E. BIRCH, citizens of the United States, residing at Crawfordsville, in the county of Montgomery and State of Indiana, have invented certain new and useful Improvements in Wire-Fence Machines, of which the following is a specification.

The object of our invention is to produce a machine capable of producing a wire fabric, composed of running wires and stay wires, the machine being particularly designed for the production of a wire fabric wherein the stay wires are secured to the intermediate running wires by means of a double loop or twist formed in the running wires and embracing the stay wires in the manner disclosed in Patent No. 893,301 issued to Wm. M. Birch July 14, 1908.

Portions of the structure are such as to be useful in the production of wire fabrics of other types and our invention is not to be limited to the particular type of fabric referred to.

The accompanying drawings illustrate our invention.

Figure 1 is a front elevation of a machine embodying our invention with intermediate portions broken away in order to show the parts which would otherwise be hidden; Fig. 2 a side elevation; Fig. 3 a vertical section to one side of the twisters; Fig. 4 a fragmentary plan just above the twisting mechanism; Fig. 5 a fragmentary plan on a plane below the twister mechanism; Fig. 6 a view of a portion of the fabric in process of formation, together with a fragment of one of the twisters for connecting the ends of the stay wires to the side wire fabric; Fig. 7 a fragmentary vertical section illustrating the stay wire guiding means; Fig. 8 a vertical section, on a larger scale, partially axially through the twister mechanism, the delivery head however being shown in full; Fig. 9 a vertical sectional detail of the twisters for one end of the stay wires; Fig. 10 a detail of the primary feeding drum; Fig. 11 a perspective detail of one of the twister heads showing the parts in initial loop forming position; Fig. 12 a similar view showing the parts in final loop forming position, Fig. 13 a plan of the twister head showing the manner of association of the stay wire with the loops formed in the running wire; Fig. 14 an axial section of one of the twister heads; Fig. 15 a plan of the twister and cut-off mechanism at the feed end of the stay wire; Fig. 16 a plan of the twister mechanism for the opposite or free end of the stay wire.

The running wires of the fabric comprise top and bottom wires 21 and intermediate wires 22. These wires are fed beneath an oscillating tension drum 23 and from thence each of said wires is carried up over an independent tension idler 24 each of which is normally yieldingly urged upward by means of a spring 25. From thence the running wires are carried beneath a fixed axis idler 26 and from thence upwardly. The edge wires 21 each pass upwardly through a rotary twister head 27, the details of which will be described later, and the intermediate wires 22 pass upwardly through guide sleeves 28, the twister heads 27 being journaled in a work table 29 and the guide sleeves 28 being also fixed in said table. From thence the running wires are passed up over a pulling drum 31 which is journaled in swinging arms 32 pivoted upon a shaft 33. By the time the running wires reach the pulling drum 31 the stay wires have been attached or connected to the running wires, as will appear later, and from the pulling drum the fabric passes down beneath an idler 34 which is placed somewhat lower than the lowest position to which the pulling drum passes, and from thence the fabric passes between a pair of mashing rolls 35, 35 and from thence down to a storage drum 36.

In operation the drum 31 is constantly rotated at a uniform speed and the connections between the main drive shaft 37 and said drum are as follows: Shaft 37 carries a pinion 38 which meshes with a gear 39 carried by a shaft 41 and this shaft carries a gear 42 (indicated by dotted circles in Fig. 3) which meshes with a gear 43 carried by a shaft 44. The opposite end of said shaft carries a pinion 45 (Fig. 2) which meshes with the gear 46 carried by the shaft 47 and this shaft carries a pinion 48 which meshes with a gear 49 carried by a shaft 33, upon which the arms 32 are pivoted. Gear 49 meshes with a gear 51 carried by the shaft 52 of the pulling drum 31. The mashing rolls 35 are also constantly rotated by means of a pinion 53 carried by one of said rolls and meshing with gear 49, the two rolls being positively geared together by a pair of gears 54, 54, indicated by dotted tooth circles in Fig. 3. The winding drum is also

continuously rotated by means of a belt 55 passing over a pulley 56 carried by shaft 33 and a pulley 57 journaled upon the shaft of the drum and connected to said shaft by the usual pawl 58 and ratchet 59. The belt drive just described is duplicated at the opposite side of the machine but this structure has been omitted from Fig. 1 of the drawings for the sake of clearness, the duplicated driving mechanism being merely indicated by the duplicate pulleys 56. This winding drum is of ordinary construction and forms no part of the present invention. The oscillating feed drum 23 is continuously oscillated in the following manner. Gear 60 carries a wrist pin 61 which is connected by a pitman 62 with a wrist pin 63 carried by an arm 64 secured to the shaft 65 which carries the drum 23.

With the running wires strung through the machine in the manner described each of the intermediate wires 22 passes vertically across the end of the twister head 71 which heads are rotatable upon horizontal axes in brackets 72, secured to the upper face of the work table 29 and these heads are spaced apart at such distances as may be desired to properly space the running wires of the fabric. Each of these twister heads is carried by a sleeve 70 provided with the operating pinions 73 at its rear end. Each head carries a pair of swinging fingers 74, 74 each of which is pivoted upon an axis 75 at right angles to the axis of the twister head and the two fingers are normally urged toward each other by light springs 76. Each of the fingers at a point intermediate in its length, is provided with a wire receiving neck 77 so as to thus form an overhanging lip 78 at its outer end. Immediately prior to the application of a stay to the running wires, a plunger 79, having a rounded tip, is projected between each pair of fingers 74 so as to spread them as shown in Fig. 12 and these various plungers 79 are carried by the cross head 81 having pins 82 at its ends projecting into cams 83, 83 carried by a shaft 84 which is continuously driven by means of a gear 85 meshing with gear 60. As soon as the plungers 79 have been moved to the position shown in Fig. 11, a series of plungers 86, carried by a cross head 87, is projected toward the plungers 79 so as to deflect the intermediate running wires 22 to a position between the fingers 74 and into engagement with the rounded end of the adjacent plunger 79, each plunger 86 having a vertical notch 88, (dotted lines Fig. 11) to engage the running wire 22 and prevent it from slipping sidewise. The head 87 is reciprocated by means of pins 89 which enter cams 91 carried by a shaft 44. As soon as the intermediate wires 22 have been deflected to the position shown in Fig. 11, the twister heads are given a complete rotation by means of a reciprocating rack bar 92 which meshes with the pinions 73 and is reciprocated intermittently by means of a pitman 93 actuated by means of cams 94 carried by a shaft 95 which is driven by a bevel gear 96 meshing with a bevel gear 97 carried by the shaft 84. The rotation of the twister heads will bring the fingers 74 into engagement with the running wire 22 upon opposite sides of the plungers 86 and 79 and will thus form a pair of loops 98, 98 (Fig. 12) in the running wire, the plungers 86 being withdrawn during the process of formation and the plungers 79 being projected to the position shown in Fig. 12 so that the middles of the loops will be deflected from the oppositely extended portion of the main body of the running wire, as clearly indicated in Figs. 12 and 13.

The running wires of the fabric, as they pass over the pulling drum 31, are positively engaged by co-acting kinking members so that there can be no slippage of the fabric on its drum. These kinking members are quite common in the art and are clearly shown in Figs. 1 and 3 comprising fixed studs 99 and movable studs 101, the movable studs being carried by the longitudinal sliding bars 102 each carrying rolls 103 at the opposite ends of the drum, the arrangement being such that the running wires are firmly clamped in place on the pulling drum. While the formation of the loops 98 is taking place there must, of course, be an adequate amount of slack provided in the running wires and the major portion of this slack is provided by a downward movement bodily of the pulling drum 31, this downward movement being accomplished by means of cams 105 carried by shaft 44 and coöperating with rolls 106 journaled on the arms 32, the downward movement of the drum 31 in no wise interfering with its continued rotation but nevertheless supplying half the amount of slack in the running wires. The additional slack necessary is drawn up from the supply end of the running wires, said wires slipping over the drum 23 as said drum is carried backward. The downward movement of the pulling drum 31 continues after the loops 98 have been completed to compensate for the continued rotation while the plungers 79 are slightly retracted to the positions shown in Fig. 13 and a series of stay wire guide blocks 108′ is projected into engagement with a series of plates 107, one of said plates being placed upon table 29 adjacent each twister head and the blocks 108′ being carried by a reciprocating head 108 which is reciprocated by means of pins 109 lying within cams 111 carried by shaft 44.

Each of the blocks 108′ is provided with a groove 112 (Fig. 7) so that, when it is associated with a plate 107 a channel is

formed for a stay wire 113 said channel being in alinement with all of the loops 98 of the various intermediate running wires 22. Just as soon as the parts reach these positions a stay wire 113 is projected through the channels 112 and the loops 98. This stay wire is brought from a substantially continuous supply into and through a guide 114 and a shear blade 115, the stay wire passing between a pair of feed rolls 116 and 117 which are positively geared together by means of a pair of gears 118 so as to rotate together at the same peripheral speed. The feed roller 117 is positively rotated at a high speed by means of the pinion 119 which meshes with the gear 121 carried by shaft 95. The roller 116 is carried upon a shaft 122 which is journaled in bearing blocks 123 which are yieldingly urged toward the feed wheel 117 by means of springs 124, but the feed roller 116 is normally held away from the roller 117 by means of a lever 125 which engages the bearing block 123 and is under the control of a cam 126 (dotted lines in Fig. 1) carried by shaft 95, this cam permitting the feed roller 116 to come into contact with the stay wire just as soon as the loops 98 are formed and plungers 79 have been retracted to the position shown in Fig. 13.

The speed of the rolls 116 and 117 is such as to very rapidly project the stay wire across the machine through the various loops 98 and cam 126 is so proportioned that the feeding movement of the stay wire will cease as soon as its free end reaches a block 131 carried by a bracket 132 on the work table 29 just beyond the farther edge wire 21 of the running wires. Immediately upon the completion of the feeding of the stay wires a shear 133 coacting with shear 115, is drawn down against the stay wire so as to sever it from the supply and this shear 133 is carried by a lever 134 which is connected by a pitman 135 (Fig. 5) the lower end of which is connected to a lever 136 carrying a roller 137 engaged by a cam 138 mounted upon shaft 150.

Immediately adjacent the shear blade 133 is a deflector finger 141 which is arc-shaped in elevation and has a circumferential groove 142 in which the running wire 21 will lie. Just as soon as the stay wire has been severed from its supply the deflector finger 141 engages the end of the stay wire and deflects the same downwardly, as indicated in Fig. 6, (the adjacent portion of the stay wire being held straight by the adjacent guide block 108′) and this downward deflection of the severed end of the stay wire brings it into the path of movement of a finger 143 carried by the upper end of the twister head 27, through which the edge running wire 21 is passing. The heads 27 are being constantly rotated by means of the spiral gear 144 meshing with the spiral gear 145 carried by the shaft 146, which is driven by a pinion 147 meshing with gear 39 so that, as soon as the severed end of the stay wire is drawn down into position to be engaged by finger 143 said finger starts to wrap the end of the stay wire around the edge running wire 21 as indicated at 160 (Fig. 6).

The encircling wrapping is completed and nicely finished by means of a pin 143″ which is also carried by the twister head 27 and lies closer to the axis thereof so that it will engage the tip of the stay wire after it has passed inwardly beyond the pin 143. While this action has been going on, the opposite end of the stay wire has been similarly downwardly deflected by deflector 141′ operated by the arm 134′, link 135′, lever 136′ and cam 138′ carried by shaft 150 and this downwardly deflected end is similarly wrapped about the adjacent edge running wire 21 by the finger 143 of the adjacent twister head 27 said twister head also having a finishing finger 143″. While the last of this twisting action is taking place, guide blocks 108′ are withdrawn and the pulling head 31 is started upwardly to the position shown in Fig. 3 thus drawing the loose eyes 98, as shown at the lower part of Fig. 6, tightly about the stay wire as shown in the upper part of Fig. 6. During this same time all of the intermediate wires 22 are positively engaged by crimper fingers 151 carried by a bar 152 on the reciprocating feed drum 23, said bar 152 having a roller 153 which is engaged by a rotary cam 154, the same cam 154 being continuously rotated by means of a gear 155 connected by a pinion 156 with gear 60.

During the upward movement of the pulling drum 31 the feeding drum 23 is being moved in the clockwise direction indicated by the double-headed arrow in Fig. 3 but the peripheral speed of this feed drum is enough less than the upward movement of the pulling drum to permit the slack of the loose eyes 98 to be taken up at the same time that the fabric as a whole is being advanced through the distance between the stays so that, during this portion of the operation, the intermediate running wires 22 are under considerable tension. During this time, however, the edge wires 21 do not yield any slack because no loops have been formed therein and it is for this reason that no means is provided upon the reciprocating drum 23 to positively engage the edge running wires 21, so that said edge running wires are drawn upwardly by the upward movement of the pulling drum 31 and slipped through the eyes 160 while they are forming, said eyes tightening upon the running wires 21 shortly after the drum 31 starts on its upward movement so that the eyes are thereby given an upward movement

which is sufficient to straighten the stay wire. In this connection it is to be remembered that the pulling drum 31 is constantly rotating in the direction indicated by the arrows so that the transverse movement of the drum bodily does not begin to be as much as the total feeding movement of the running wires.

In order to produce a fabric in which the stay wires are more frequent we provide journal bearings 161 into which shaft 47 may be placed, this journal bearing being so placed that the compound gear 46—48 may be reversed on the shaft 47 and gear 46 may form a direct connection between gear 45 and gear 49.

We claim—

1. In a wire fabric machine, the combination with means for supporting a plurality of running-wires, of a plurality of loop-forming mechanisms each comprising portions adapted to engage a running-wire and form a pair of oppositely extending loops therein, and pulling mechanism arranged to intermittently pull upon the looped running-wires to tighten said loops about a stay-wire extending therethrough.

2. In a wire fabric machine, the combination with means for supporting a plurality of running-wires, of a plurality of loop-forming mechanisms each comprising portions adapted to engage a running-wire and form a pair of oppositely extending loops therein, stay-wire feeding mechanism adapted to deliver the stay-wire through the loops of the running-wires, and pulling mechanism arranged to intermittently pull upon the looped running-wires to tighten said loops about a stay-wire extending therethrough.

3. In a wire fabric machine, the combination of a plurality of looper heads each provided with members formed to engage a running-wire and form therein a pair of oppositely extending loops, means for intermittently operating said looper heads, means for intermittently bringing the running-wires into coöperative relation with the looper heads, and pulling mechanism to intermittently pull upon the running-wires to draw the loops therein upon the inserted stay-wire.

4. In a wire fabric machine, the combination of a plurality of looper heads provided with members formed to engage a running-wire and form therein a pair of oppositely extending loops, means for intermittently operating said looper heads, means for intermittently bringing the running-wires into coöperative relation with the looper heads, stay-wire feeding mechanism intermittently delivering stay-wire through the loops formed in the running-wires, and pulling mechanism to intermittently pull upon the running-wires to draw the loops therein upon the inserted stay-wire.

5. In a wire fabric machine, the combination of a plurality of looper heads, each comprising a rotary body, a pair of wire-engaging fingers movably mounted on said body, and a plunger for controlling the movement and position of said fingers; means for bringing a running-wire into cooperative relation with said fingers, means for intermittently rotating the looper head to form a loop or loops in the running-wire, and pulling mechanism to intermittently pull upon the running-wires to draw the loops therein upon an inserted stay-wire.

6. In a wire fabric machine, the combination of a plurality of looper heads, each comprising a rotary body, a pair of wire-engaging fingers movably mounted on said body, and a plunger for controlling the movement and position of said fingers; means for bringing a running-wire into coöperative relation with said fingers, means for intermittently rotating the looper head to form a loop or loops in the running-wire, stay-wire feeding mechanism intermittently delivering stay-wires through the loops formed in the running-wires, and pulling mechanism to intermittently pull upon the running-wires to draw the loops therein upon an inserted stay-wire.

7. In a wire fabric machine, the combination of a rotary looper head, a pair of fingers carried by said looper head, mechanism for engaging a running-wire and bringing the same into coöperative relation between said fingers, and means for intermittently rotating the looper head to bring the fingers thereof into engagement with the running-wire to produce a pair of oppositely extending loops therein.

8. In a wire fabric machine, the combination of a rotary looper head, a pair of movable fingers carried by said looper head, mechanism for engaging a running-wire and bringing the same into coöperative relation between said fingers, means for intermittently rotating the looper head to bring the fingers thereof into engagement with the running-wire to produce a pair of oppositely extending loops therein, and a plunger cooperating with the fingers and stay-wire to assist in the formation of said loops.

9. In a wire fabric machine, the combination of a rotary looper head, a pair of fingers carried by said looper head, mechanism for engaging a running-wire and bringing the same into coöperative relation between said fingers, means for intermittently rotating the looper head to bring the fingers thereof into engagement with the running-wire to produce a pair of oppositely extending loops therein, and pulling mechanism to engage the running-wires to tighten the loops thereof upon an inserted stay-wire.

10. In a wire fabric machine, the combination of a rotary looper head, a pair of mov-

able fingers carried by said looper head, mechanism for engaging a running-wire and bringing the same into coöperative relation between said fingers, means for intermittently rotating the looper head to bring the fingers thereof into engagement with the running-wire to produce a pair of oppositely extending loops therein, a plunger coöperating with the fingers and stay-wire to assist in the formation of said loops, and pulling mechanism to engage the running-wires to tighten the loops thereof upon an inserted stay-wire.

11. In a wire fabric machine, the combination of a rotary looper head, a pair of fingers carried by said looper head, mechanism for engaging a running-wire and bringing the same into coöperative relation between said fingers, means for intermittently rotating the looper head to bring the fingers thereof into engagement with the running-wire to produce a pair of oppositely extending loops therein, and stay wire feeding mechanism to project stay-wires through the loops formed in the running-wire.

12. In a wire fabric machine, the combination of a rotary looper head, a pair of movable fingers carried by said looper head, mechanism for engaging a running-wire and bringing the same into coöperative relation between said fingers, means for intermittently rotating the looper head to bring the fingers thereof into engagement with the running-wire to produce a pair of oppositely extending loops therein, a plunger cooperating with the fingers and stay-wire to assist in the formation of said loops, and stay wire feeding mechanism to project stay-wires through the loops formed in the running-wire.

13. In a wire fabric machine, the combination of a rotary looper head, a pair of fingers carried by said looper head, mechanism for engaging a running-wire and bringing the same into coöperative relation between said fingers, means for intermittently rotating the looper head to bring the fingers thereof into engagement with the running-wire to produce a pair of oppositely extending loops therein, pulling mechanism to engage the running-wires to tighten the loops thereof upon an inserted stay-wire, and stay wire feeding mechanism to project stay-wires through the loops formed in the running-wire.

14. In a wire fabric machine, the combination of a rotary looper head, a pair of movable fingers carried by said looper head, mechanism for engaging a running-wire and bringing the same into coöperative relation between said fingers, means for intermittently rotating the looper head to bring the fingers thereof into engagement with the running-wire to produce a pair of oppositely extending loops therein, a plunger coöperating with the fingers and stay-wire to assist in the formation of said loops, pulling mechanism to engage the running-wires to tighten the loops thereof upon an inserted stay-wire, and stay wire feeding mechanism to project stay-wires through the loops formed in the running-wire.

15. In a wire fabric machine, the combination of a rotary pulling drum, mechanism carried by said drum for positively engaging the running-wires to exert a pull thereon, a support for said pulling drum, mechanism for reciprocating said support, looper mechanism coöperating with the running-wire before the pulling drum to form intermediate loops in said running-wires, a tension drum, mechanism carried by the said drum for intermittently engaging the running-wires, and driving connections for the said pulling drum and said tension drum of such character that, when the pulling drum is moved bodily away from the loop-forming mechanism, the tension drum will engage the running-wires to resist the pull of the pulling drum.

16. In a wire fabric machine, the combination of a rotary pulling drum, mechanism carried by said drum for positively engaging the running-wires to exert a pull thereon, a support for said pulling drum, mechanism for reciprocating said support, looper mechanism coöperating with the running-wire before the pulling drum to form intermediate loops in said running-wires, stay-wire feeding mechanism for projecting a stay-wire through such loops, a tension drum, mechanism carried by the said drum for intermittently engaging the running-wires, and driving connections for the said pulling drum and said tension drum of such character that, when the pulling drum is moved bodily away from the loop-forming mechanism, the tension drum will engage the running-wires to resist the pull of the pulling drum.

17. In a wire fabric machine, the combination of a rotary pulling drum, mechanism carried by said drum for positively engaging the running-wires to exert a pull thereon, a support for said pulling drum, mechanism for reciprocating said support, looper mechanism coöperating with the running-wire before the pulling drum to form intermediate loops in said running-wires, a tension drum, mechanism carried by the said drum for intermittently engaging the running-wires, and driving connections for the said pulling drum and said tension drum of such character that, when the pulling drum is moved bodily away from the loop-forming mechanism, the tension drum will engage the running-wires to resist the pull of the pulling drum, and yielding take-ups engaging the running-wires between the tension drum and the loop-forming mechanism.

18. In a wire fabric machine, the combination of a rotary pulling drum, mechanism carried by said drum for positively engaging the running-wires to exert a pull thereon, a support for said pulling drum, mechanism for reciprocating said support, looper mechanism coöperating with the running-wire before the pulling drum to form intermediate loops in said running-wires, stay-wire feeding mechanism for projecting a stay-wire through such loops, a tension drum, mechanism carried by the said drum for intermittently engaging the running-wires, driving connections for the said pulling drum and said tension drum of such character that, when the pulling drum is moved bodily away from the loop-forming mechanism, the tension drum will engage the running-wires to resist the pull of the pulling drum, and yielding take-ups engaging the running wires between the tension drum and the loop-forming mechanism.

19. In a wire fabric machine, the combination of a rotary pulling drum, mechanism carried by said drum for positively engaging the running-wires to exert a pull thereon, a support for said pulling drum, mechanism for reciprocating said support, looper mechanism arranged to engage the intermediate running-wires and form intermediate loops therein, stay-wire wrappers arranged in conjunction with the edge running-wires, stay-wire benders for bending the ends of the stay-wires away from the pulling drum and delivering the same to the stay-wire wrappers, a tension drum arranged before the looper and twister mechanisms and provided with mechanism for positively engaging the intermediate running-wires only, and driving mechanism for the pulling drum and tension drum whereby, when the pulling drum is moved away from the looper mechanism, the pull thereof upon the intermediate looped running-wires will be resisted by the tension drum.

20. In a wire fabric machine, the combination of a rotary pulling drum, mechanism carried by said drum for positively engaging the running-wires to exert a pull thereon, a support for said pulling drum, mechanism for reciprocating said support, looper mechanism arranged to engage the intermediate running-wires and form intermediate loops therein, stay-wire wrappers arranged in conjunction with the edge running-wires, stay-wire feeding mechanism for projecting a stay-wire through the loops formed in the intermediate running-wires, stay-wire benders for bending the ends of the stay-wires away from the pulling drum and delivering the same to the stay-wire wrappers, a tension drum arranged before the looper and twister mechanisms and provided with mechanism for positively engaging the intermediate running-wires only, and driving mechanism for the pulling drum and tension drum whereby, when the pulling drum is moved away from the looper mechanism, the pull thereof upon the intermediate looped running-wires will be resisted by the tension drum.

21. In a wire fabric machine, the combination of a rotary pulling drum, mechanism carried by said drum for positively engaging the running-wires to exert a pull thereon, a support for said pulling drum, mechanism for reciprocating said support, looper mechanism arranged to engage the intermediate running-wires and form intermediate loops therein, stay-wire wrappers arranged in conjunction with the edge running-wires, stay-wire benders for bending the ends of the stay-wires away from the pulling drum and delivering the same to the stay-wire wrappers, a tension drum arranged before the looper and twister mechanisms and provided with mechanisms for positively engaging the intermediate running-wires only, driving mechanism for the pulling drum and tension drum whereby, when the pulling drum is moved away from the looper mechanism, the pull thereof upon the intermediate looped running-wires will be resisted by the tension drum, and yielding take-ups engaging the running-wires between the tension drum and the looper and twister mechanisms.

22. In a wire fabric machine, the combination of a rotary pulling drum, mechanism carried by said drum for positively engaging the running-wires to exert a pull thereon, a support for said pulling drum, mechanism for reciprocating said support, looper mechanism arranged to engage the intermediate running-wires and form intermediate loops therein, stay-wire wrappers arranged in conjunction with the edge running-wires, stay-wire feeding mechanism for projecting a stay-wire through the loops formed in the intermediate running-wires, stay-wire benders for bending the ends of the stay-wires away from the pulling drum and delivering the same to the stay-wire wrappers, a tension drum arranged before the looper and twister mechanisms and provided with mechanism for positively engaging the intermediate running-wires only, and driving mechanism for the pulling drum and tension drum whereby, when the pulling drum is moved away from the looper mechanism, the pull thereof upon the intermediate looped running-wires will be resisted by the tension drum, and yielding take-ups engaging the running-wires between the tension drum and the looper and twister mechanisms.

23. In a wire fabric machine, a feeding mechanism for the running wires comprising a rotary drum, means carried by said drum for engaging the running wires, means for

rotating said drum, and means for reciprocating said drum bodily longitudinally of the running wires.

24. In a wire fabric machine, the combination of a pair of movable supports, a pulling drum journaled in the supports, means carried by the pulling drum for engaging the running wires of the fabric, means for rotating said drum in one direction, and means for bodily reciprocating the supports and drum longitudinally of the running wires.

25. In a wire fabric machine, the combination of a pair of movable supports, a pulling drum journaled in the supports, means carried by the pulling drum for engaging the running wires of the fabric, means for continuously rotating said drum in one direction, and means for bodily reciprocating the supports and drum longitudinally of the running wires.

26. In a wire fabric machine, a feeding mechanism for the running wires comprising a rotary drum, means carried by said drum for engaging and pulling the running wires, means for rotating said drum, means for reciprocating said drum bodily longitudinally of the running wires, and means for engaging the running wires before they reach the drum and forming therein stay-receiving loops.

27. In a wire fabric machine, a feeding mechanism for the running wires comprising a rotary drum, means carried by said drum for engaging and pulling the running wires, means for rotating said drum, means for reciprocating said drum bodily longitudinally of the running wires, means for engaging the running wires before they reach the drum, and stay wire feeding mechanism for propelling a stay wire into and through the loops formed in the running wires.

28. In a wire fabric machine, the combination of a pair of movable supports, a pulling drum journaled in the supports, means carried by the pulling drum for engaging the running wires of the fabric, means for rotating said drum in one direction, means for bodily reciprocating the supports and drum longitudinally of the running wires, means for engaging the running wires before they reach the pulling drum and forming therein stay-receiving loops, and means for propelling stay wires into and through said loops.

29. In a wire fabric machine, the combination of a pair of movable supports, means carried by the pulling drum for engaging the running wires of the fabric, means for continuously rotating said drum in one direction, means for bodily reciprocating the supports and drum longitudinally of the running wires, means for engaging the running wires before they reach the pulling drum and forming therein stay-receiving loops, and means for propelling stay wires into and through said loops.

30. In a wire fabric machine, the combination of a pair of movable supports, a pulling drum journaled in the supports, means carried by the pulling drum for engaging the running wires of the fabric, means for rotating said drum in one direction, means for bodily reciprocating the supports and drum longitudinally of the running wires, and means for engaging the running wires before they reach the pulling drum and forming therein stay-receiving loops.

31. In a wire fabric machine, the combination of a pair of movable supports, a pulling drum journaled in the supports, means carried by the pulling drum for engaging the running wires of the fabric, means for continuously rotating said drum in one direction, means for bodily reciprocating the supports and drum longitudinally of the running wires, and means for engaging the running wires before they reach the pulling drum and forming therein stay-receiving loops.

In witness whereof, we have hereunto set our hands and seals at Crawfordsville, Indiana, this 24th day of November, A. D. one thousand nine hundred and nine.

WILLIAM M. BIRCH. [L. S.]
CHARLES E. BIRCH. [L. S.]

Witnesses:
MINTEA C. MASON,
CLIFFORD D. VORIS.