A. E. BLASHILL.

WIRE FABRIC MACHINE.

APPLICATION FILED JUNE 6, 1914. RENEWED MAR. 2, 1922.

1,437,488.

Patented Dec. 5, 1922.

8 SHEETS—SHEET 1.

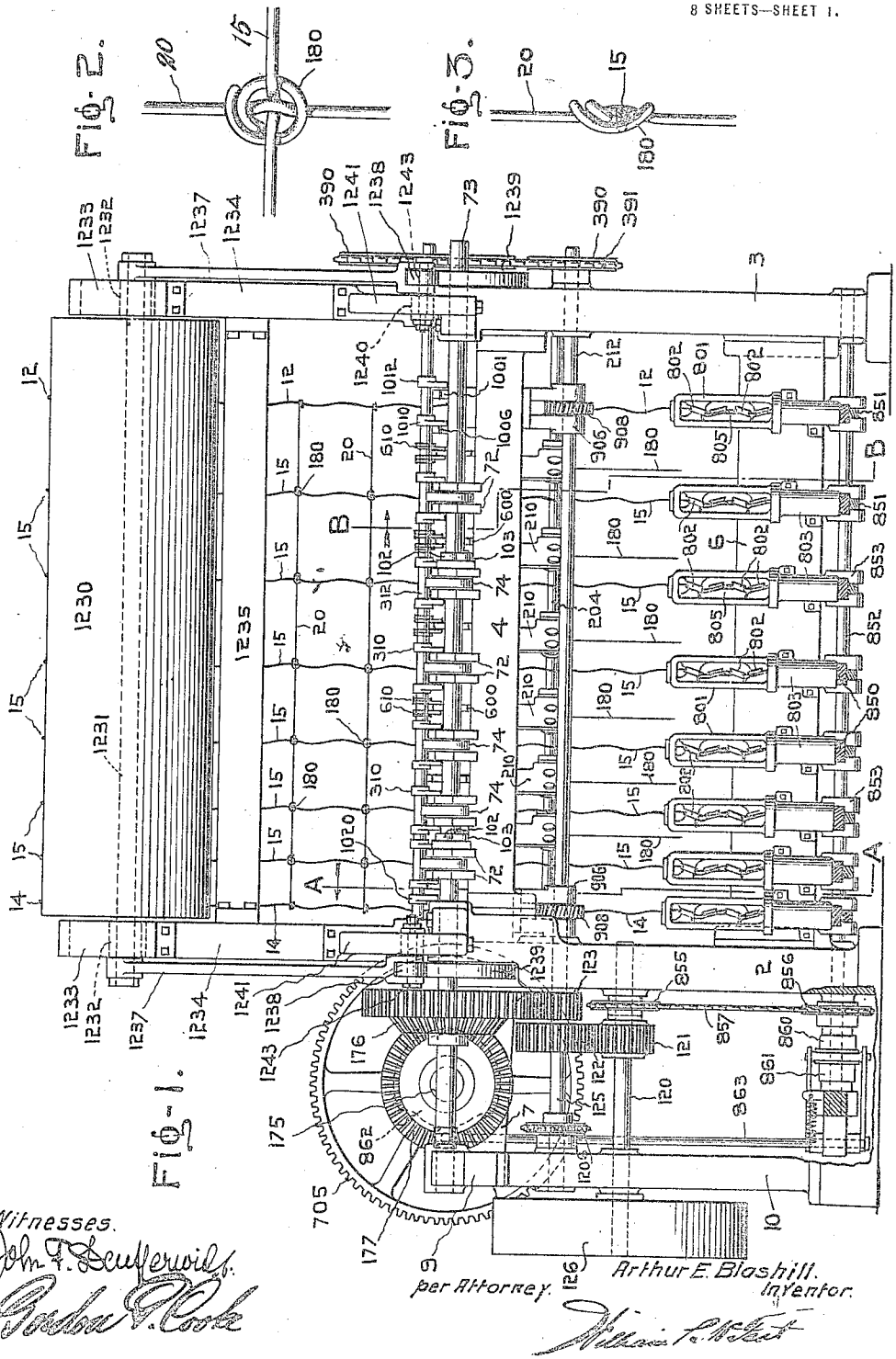


Fig. 1.

Fig. 2.

Fig. 3.

Witnesses.

John T. Sculfervoil Jr.

Gordon P. Cook

Arthur E. Blashill.
Inventor.

per Attorney.

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8 SHEETS—SHEET 2.

Fig. 5.

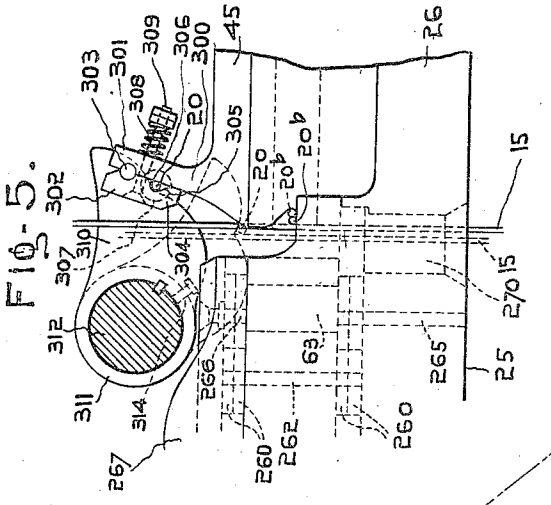
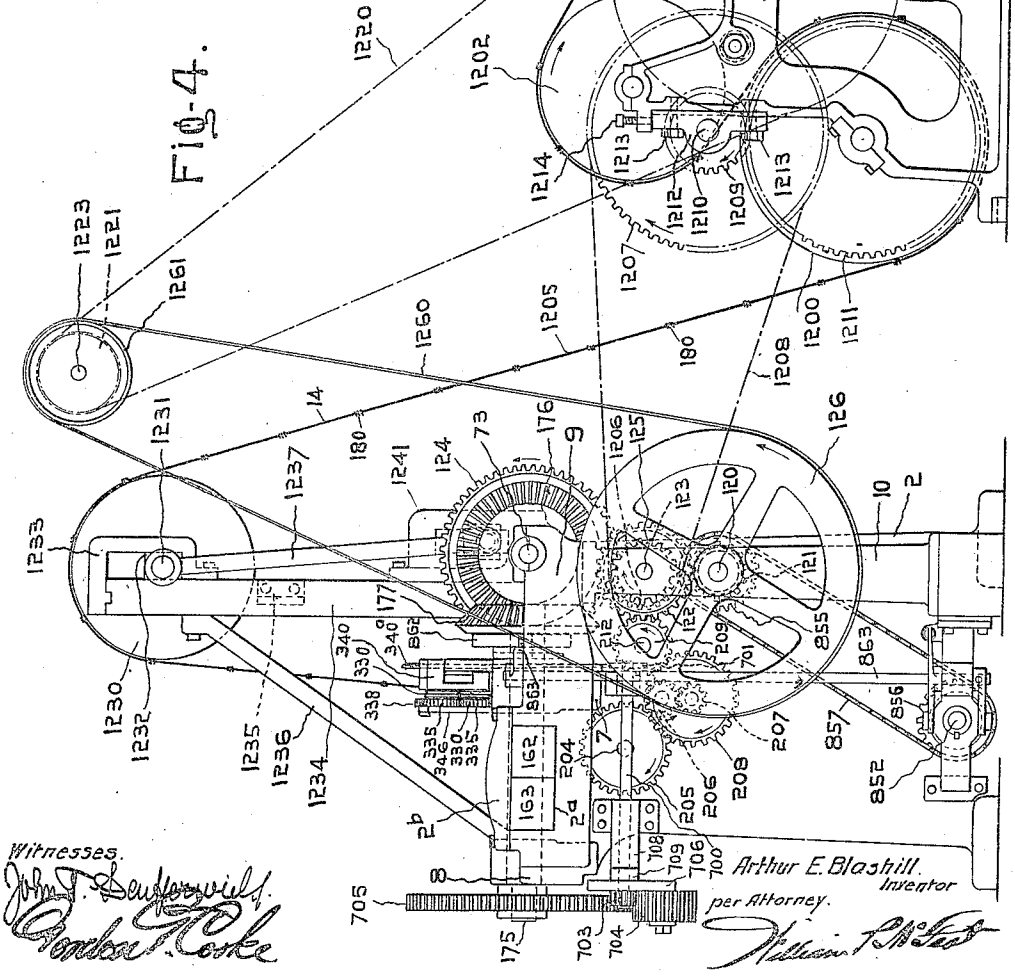


Fig. 4.



Witnesses.

Arthur E. Blashill.
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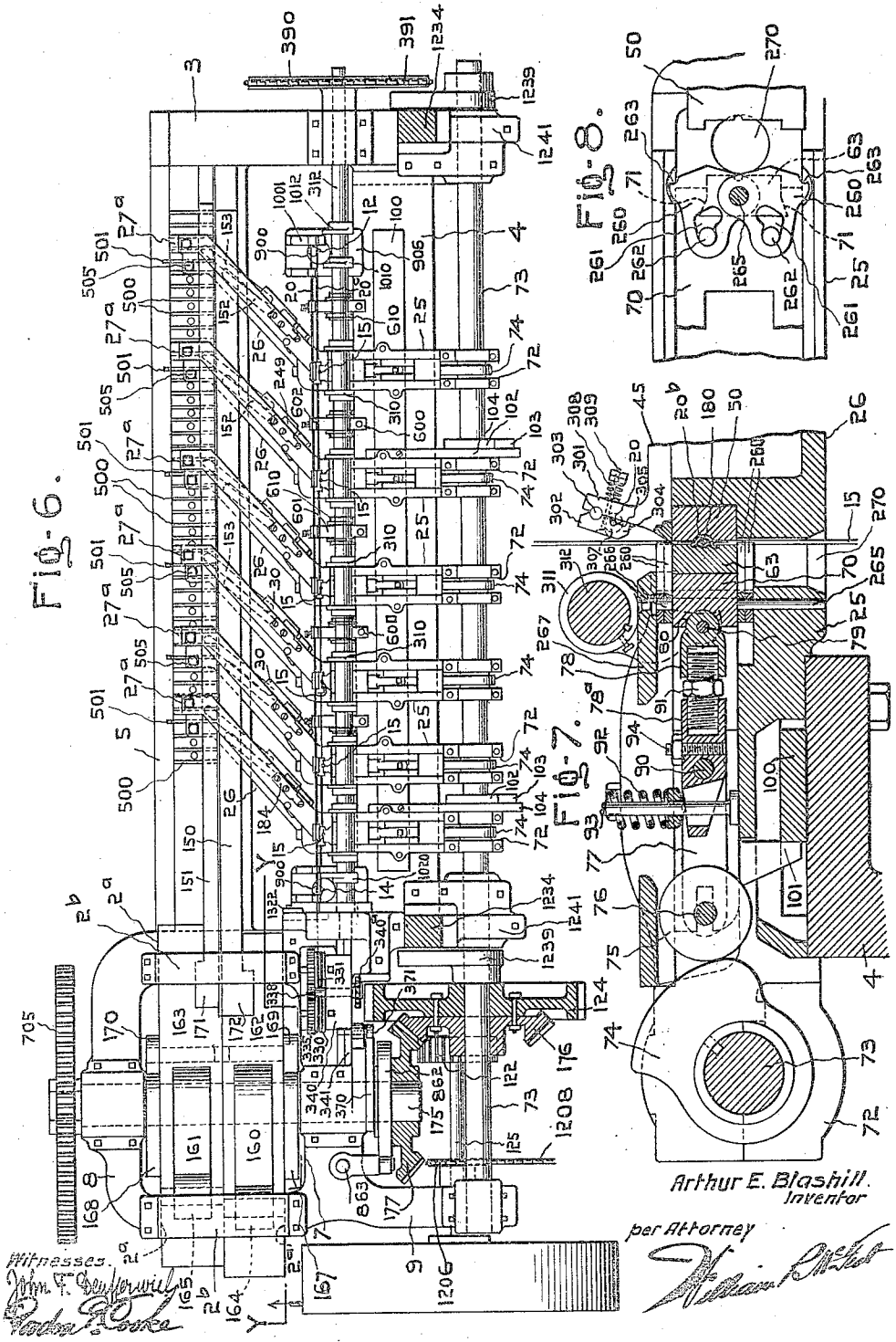


Fig. 6.

Fig. 8.

Fig. 7.

Witnesses.

John F. Dewhurst

Paul Cooke

Arthur E. Blashill
Inventor

per Attorney

William Clifford

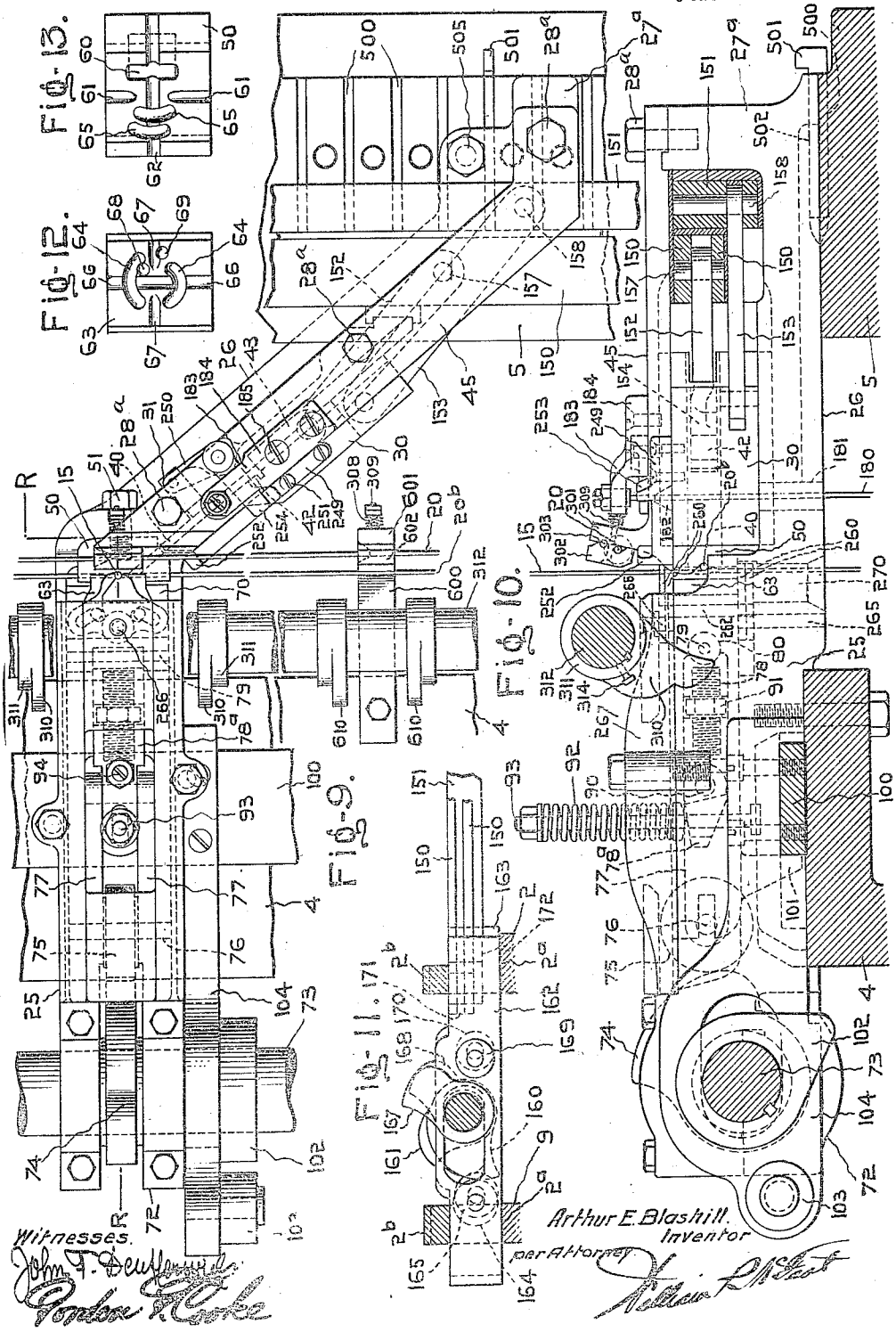
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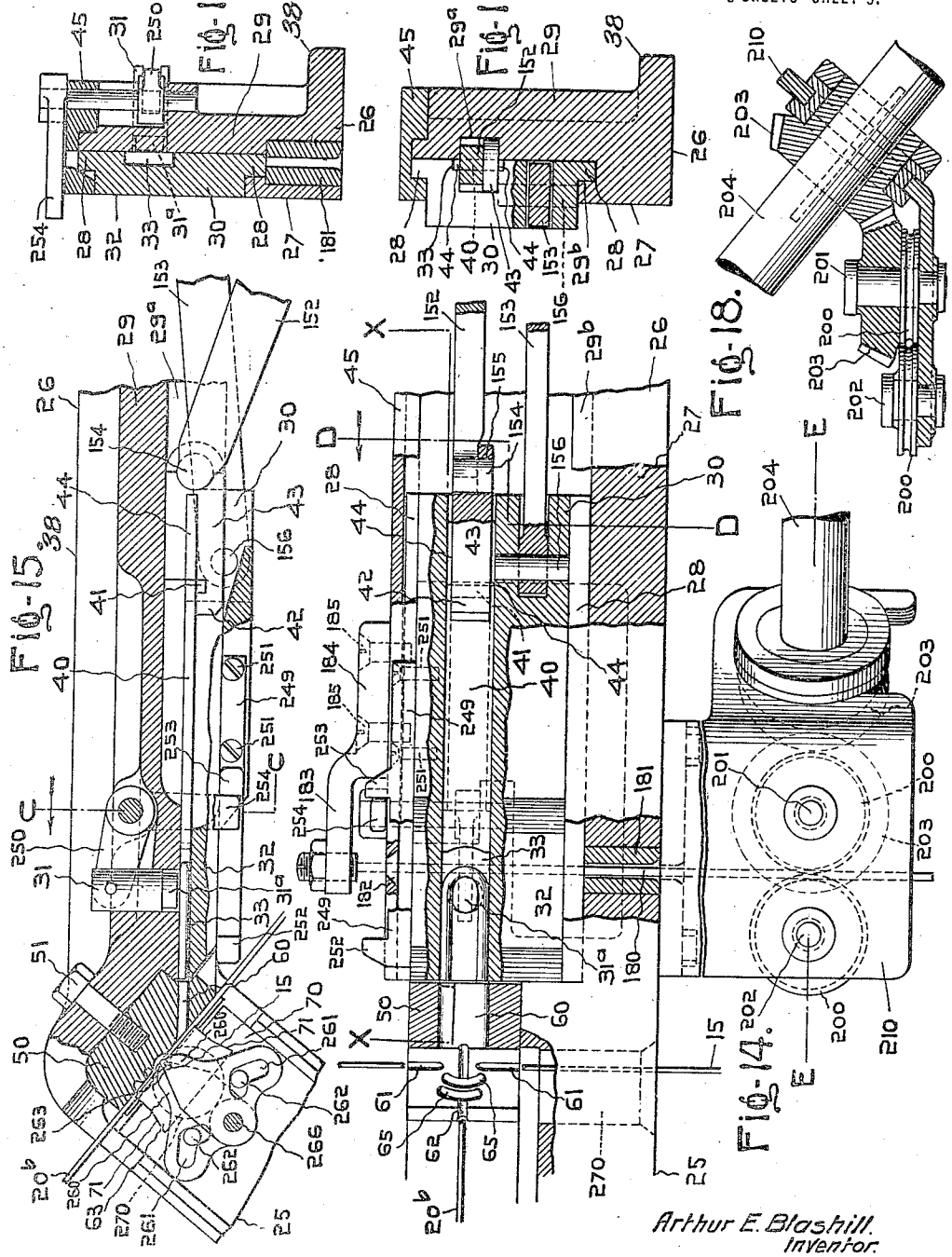


Fig. 16.

Fig. 17.

Fig. 18.

Fig. 15.

Fig. 14.

Witnesses.

Arthur E. Blashill.
Inventor.

per Attorney.

A. E. BLASHILL.

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8 SHEETS—SHEET 6.

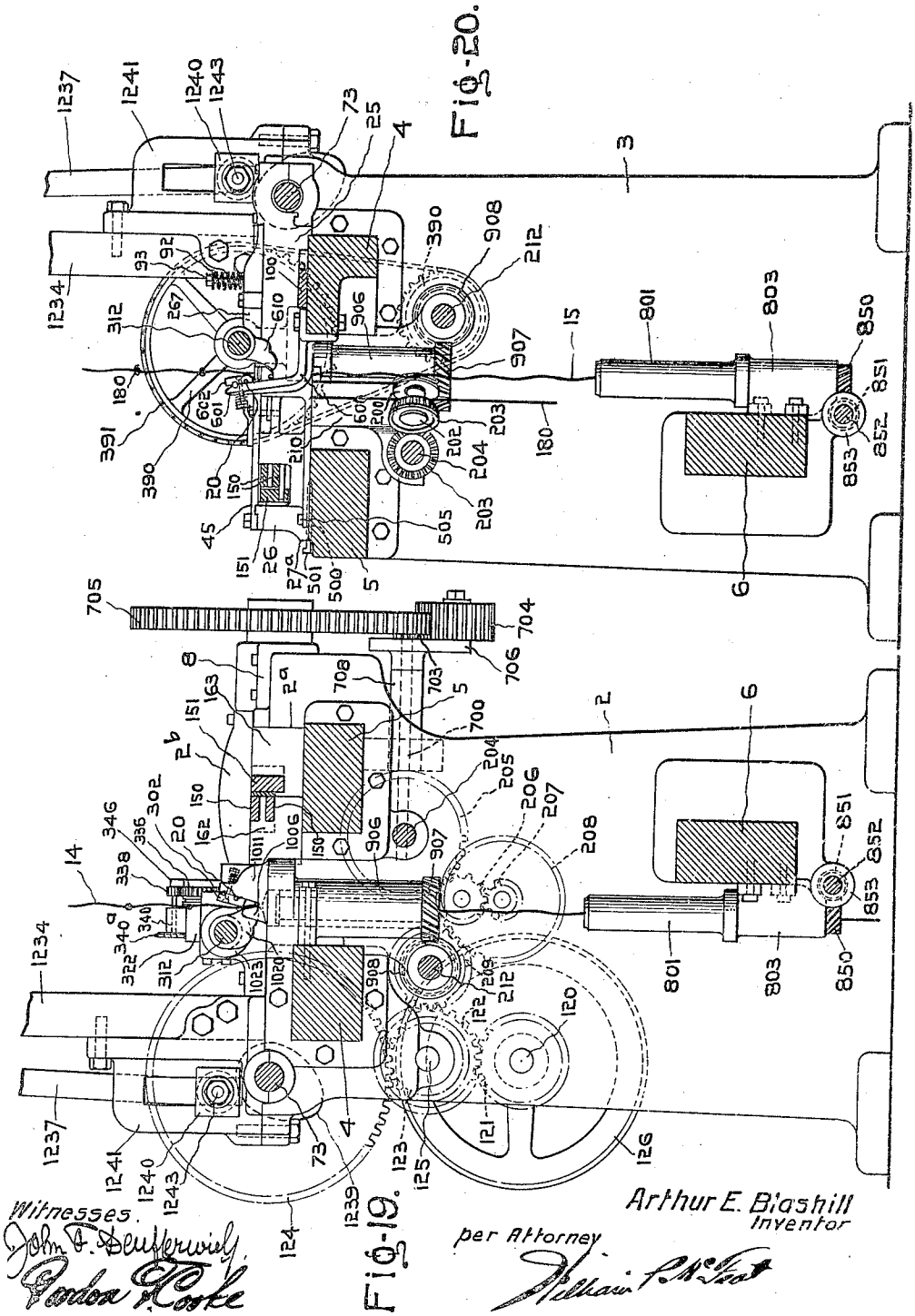


Fig-20.

Fig-19.

Witnesses.
John F. Deufferwiel
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Arthur E. Blashill
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WIRE FABRIC MACHINE.

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8 SHEETS--SHEET 7.

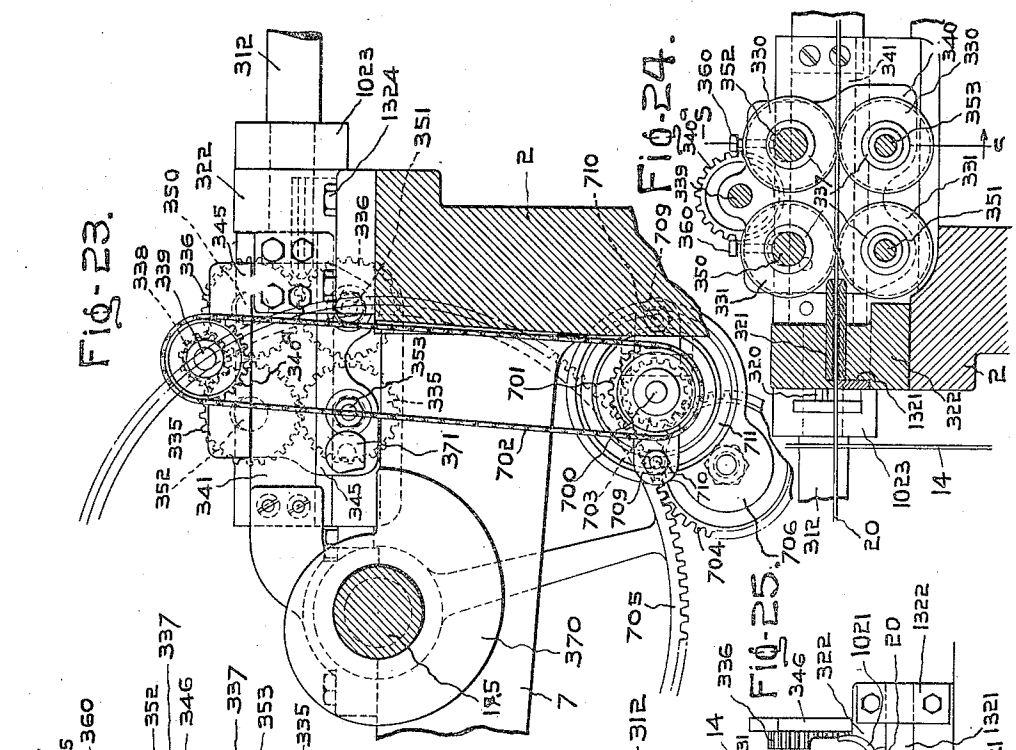


Fig. 23.

Fig. 24.

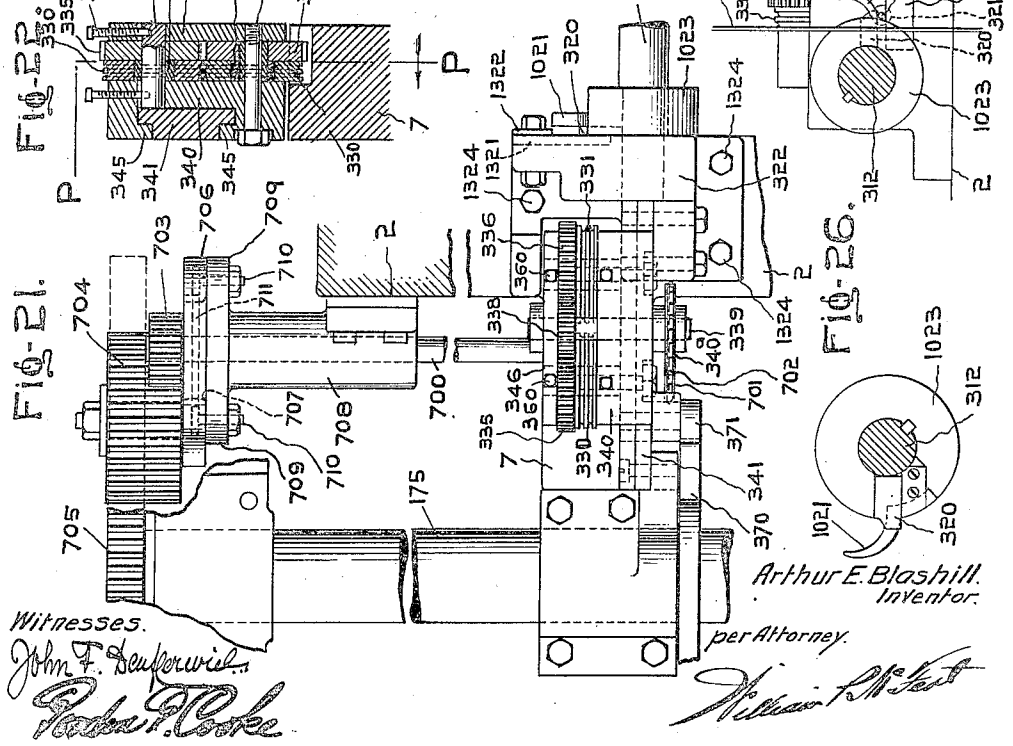


Fig. 21.

Fig. 22.

Fig. 25.

Fig. 26.

Witnesses.

John F. Dewforwiel.

Gordon P. Cooke

Arthur E. Blashill.
Inventor.

per Attorney.

William P. McIntosh

A. E. BLASHILL.

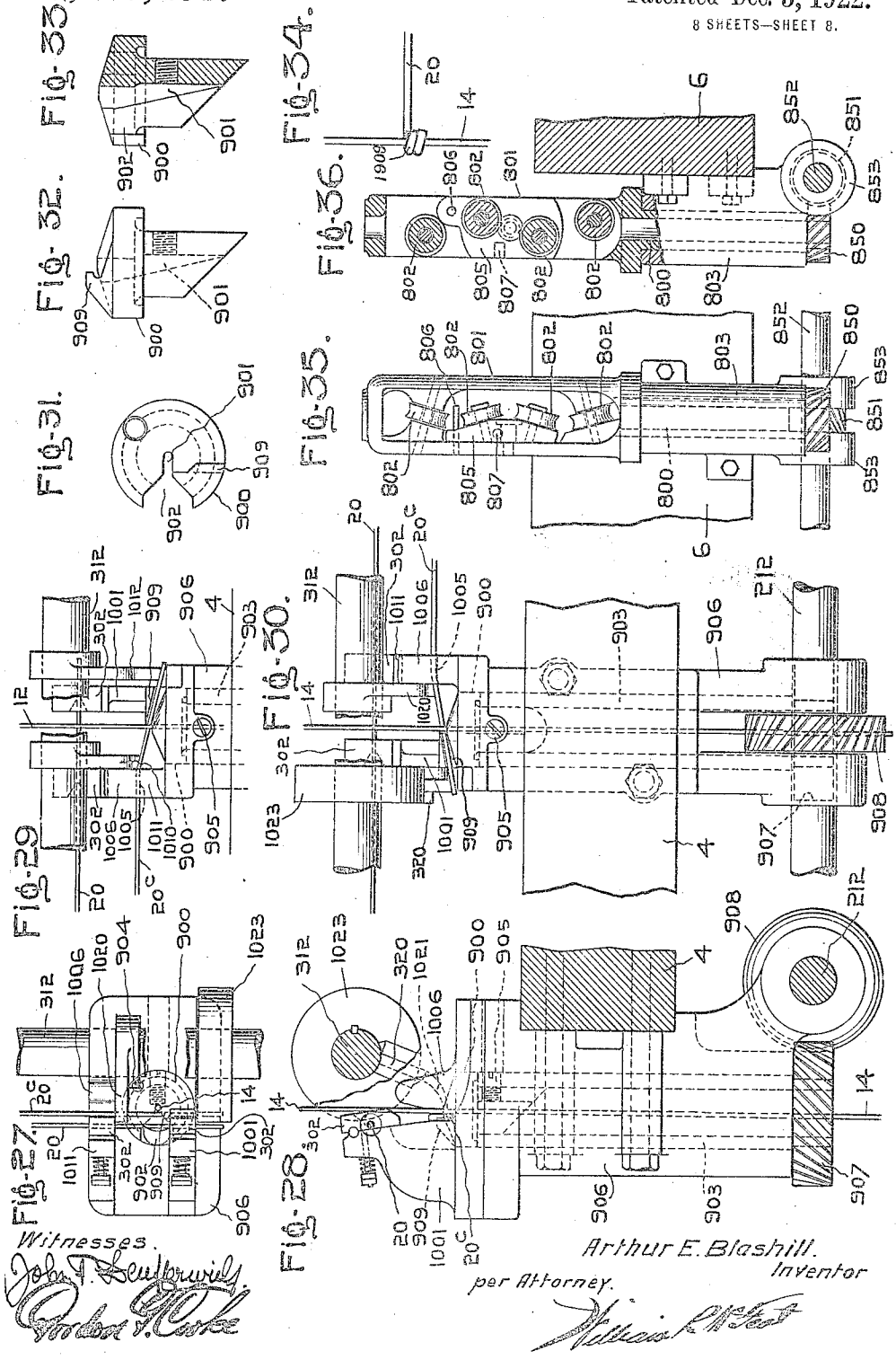
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Patented Dec. 5, 1922.

8 SHEETS—SHEET 8.



Witnesses.

John T. Newhouse

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per Attorney.

Wilkinson & Fost

Patented Dec. 5, 1922. 1,437,488

UNITED STATES PATENT OFFICE.

ARTHUR E. BLASHILL, OF WESTMOUNT, QUEBEC, CANADA, ASSIGNOR TO THE BLASHILL WIRE MACHINERY COMPANY, LIMITED, OF MONTREAL, CANADA, A CORPORATION OF CANADA.

WIRE-FABRIC MACHINE.

Application filed June 6, 1914, Serial No. 843,594. Renewed March 2, 1922. Serial No. 540,664.

(GRANTED UNDER THE PROVISIONS OF THE ACT OF MARCH 3, 1921, 41 STAT. L., 1313.)

To all whom it may concern:

Be it known that I, ARTHUR E. BLASHILL, a subject of the King of Great Britain, residing at the city of Westmount, in the Province of Quebec, Dominion of Canada, 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 same.

My invention relates particularly to machines for producing wire fabric, the strands and stay-wires of which are connected together by separately attached fastening devices or locks; and it has for its object to increase the efficiency of machines for this purpose and reduce the weight of the operating parts thus enabling a higher speed of operation to be obtained. A further object is to produce a fabric having greater durability.

The invention may be said briefly to consist of a machine comprising a series of distinct lock-forming mechanisms, means for causing the metal from which the lock is to be formed to enter the lock-forming mechanisms, and operating means common to the series of lock-formers. More specifically stated the invention may be said to consist of means whereby the wire from which a staple is formed is fed in a direct line to position to be cut and formed into a staple, means whereby the staple thus formed is guided or controlled and advanced while lying in the same plane in which it is formed to position engaging the intersection of the wires; a series of independently carried and relatively adjustable lock-forming mechanisms whereby a lock is formed and simultaneously caused to lock the intersection of a pair of wires; a feature in conjunction with the means last mentioned being that each lock-forming mechanism includes as a component part a safety device automatic in its action. A further feature consists in combining with the machine parts proper a device having the dual function of a coiler and a tension device, thus obviating the use of a separate tension and the separate coiling or crimping devices. A feature of the invention consists of means whereby the stay-wire is fed continuously—that is to say, is projected from the feeding means continuously—the wire thus projected being stalled however during a momentary period while being cut, and in combination with this means I provide means whereby the stay-wires are cut into stays of predetermined uniform length, another novel feature consisting of this last-mentioned means being that the feed devices are prevented from injuring the galvanizing on the wire while it is being cut. Other features consist of a particular combination of parts whereby the shifting of the stays from the position to which they are fed to weaving position is facilitated; means for facilitating the twisting of the stay-wire around the top and bottom strands; means for taking up the web as it is woven; and the invention also consists of the combinations, construction, and the particular arrangements of parts hereinafter described and illustrated.

For full comprehension, however, of my invention reference must be had to the accompanying drawings forming a part of this specification in which similar reference characters indicate the same parts, and wherein:

Figure 1 is a front elevation of my improved wire fabric machine;

Figs. 2 and 3 are detail illustrations of the lock made by the machine, the illustrations being viewed at right angles to each other;

Fig. 4 is an end elevation of the machine;

Fig. 5 is a detail illustration of a part of the means for placing the stay wires;

Fig. 6 is a plan view of the tables of the machine with the parts supported thereon and approximately on the same level therewith;

Fig. 7 is a transverse vertical sectional view taken on line R—R, Fig. 9, and illustrating particularly the die operating mechanism;

Fig. 8 is a plan view of the means for centreing the strand wire;

Fig. 9 is a detail plan view of the distinct lock forming mechanism drawn to an enlarged scale;

Fig. 10 is a side elevation projected from the lock forming mechanism illustrated in

Fig. 9, the supporting and operating means common to the other mechanism being illustrated in vertical sectional view;

Fig. 11 is a longitudinal vertical sectional view taken on line Y—Y, Fig. 6;

Fig. 12 is a face view of the fixed die;

Fig. 13 is a similar view of the movable die;

Fig. 14 is a side elevation of the staple forming parts and the parts for operating and supporting the same, the parts being broken away to illustrate the guiding means for the staple wire and the plunger in sectional view;

Fig. 15 is a sectional view taken on line X—X, Fig. 14;

Fig. 16 is a section taken on line C—C, Fig. 15;

Fig. 17 is a section taken on line D—D, Fig. 14;

Fig. 18 is a horizontal sectional view taken on line E—E, Fig. 14, and illustrating particularly the rolls for feeding staple wire;

Figs. 19 and 20 are vertical sectional views taken on lines A—A and B—B, Fig. 1, and looking in opposite directions as indicated by arrows;

Fig. 21 is a plan view of the stay wire feeding mechanism with parts of the frame broken away;

Fig. 22 is a vertical sectional view taken on line S—S, Fig. 24;

Fig. 23 is a side elevation of the stay wire feeding mechanism, this figure having a projection of the lower side of Fig. 21 although placed to one side thereof;

Fig. 24 is a vertical sectional view taken on line P—P, Fig. 22, and illustrating particularly the feed rolls of the stay wire feeding mechanism;

Fig. 25 is a detail illustration of the cutting mechanism;

Fig. 26 is a detail view of the cutter;

Fig. 27 is a plan view of the means for twisting the lower end of a stay wire around the bottom strand;

Fig. 28 is a side elevation of the mechanism shown in Fig. 27, parts of the machine frame being shown in vertical sectional view;

Fig. 29 is a similar view of the means for twisting the upper end of the stay wire around the top strand;

Fig. 30 is a side elevation of the mechanism shown in Fig. 29;

Figs. 31, 32 and 33 are detail views of the twisting tool;

Fig. 34 is a detail view of a twisted end of a stay wire engaging a strand; and

Figs. 35 and 36 are side elevation and vertical sectional view, respectively, of the main member of the combined coiler and tension device.

The machine frame consists of frame members 2 and 3, united by a pair of upper beams 4 and 5 and a lower beam 6, the upper beams serving as tables for supporting parts of the operating gear to be presently described. The machine member 2 has a slideway 2^a covered by a cap 2^b and a boss 7 overhanging an open horizontal frame portion 8 having an arm 9 supported from the base by a column 10. The tables 4 and 5 have fastened thereto the series of lock formers, by which a series of locks are formed and simultaneously made to lock together the intersecting strands and stays which are indicated at 12, 14 and 15 and 20 respectively, the reference numerals 12 and 14 indicating the top and bottom strands respectively and 15 the intermediate strands. The lock formers of the series are the same in every respect, and consequently only one need be described.

Each lock-former comprises devices for feeding the locking-wire, cutting staple lengths therefrom, and forming them first into staples and then the staples into locks embracing the intersecting strands and stay-wires. The devices are all located in a carrier rigidly secured upon the tables 4 and 5. Each carrier consists of a box-like casting 25 having an angular extension 26 of substantially inverted T-form, one flange 27 of which is of greater depth than the other 38 and formed with an upright flange 29 serving as a guide for a plunger 30 by which, in conjunction with an intermittently horizontally reciprocatory pin 31 (to be hereinafter further described), the staple is formed. The end of the angular extension opposite to the box-like member is turned as at 27^a to extend at right angles to the table portion 5 upon which it rests. The connection between the extension 27^a of each casting and the table 5 consists of a series of spaced grooves 500 and a key 501 inserted half into either one of a pair of grooves 502 in the underside of the extension and half into one of the grooves 500. The grooves 500 illustrated in dotted lines, Figure 10, and 502 are, respectively, spaced one half inch and one inch apart in order to enable a one-half inch adjustment to be had; these parts being in this manner held against displacement in parallel planes, relative displacement at right angles being prevented by a bolt 505. This plunger 30 consists of a member of oblong cross section each side edge having a tongue 28 and one end being reduced in thickness as at 32, while a flat groove 33 extends throughout one side and is deepened as at 29^a, see Figure 15, within the thicker portion of the plunger. The groove accommodates and acts as a guide for a second plunger by which the staple is forced into dies for forming it into the lock. This second plunger consists of a flat bar 40 formed with, a

lateral hook 41 engaging a hook 42 on a cross-head 43 having side flanges 44 in alinement with the sides of the plunger bar 40 which is of greater width than the main body of the cross-head. The plunger-bar is guided in the flat groove 33 and the cross-head in the deeper portion 29ª of the groove. The width of the plunger 30 from the plunger 40 to the bottom is equal to one-half the length required for the staple-blank, the bottom and top tongues 28 slidably engaging the groove formed by the flange 29ᵇ and a corresponding groove formed in a cap 45. The cap extends from end to end of the angular extension 26 to the top of which it is secured by screws 28ª.

The staple formed by plunger 30 and pin 31 is forced by plunger 40 into a matrix presented by a pair of dies carried within the adjacent end of the member 25, one die being fixed and the other movable. The fixed die is indicated at 50, and it is secured by a cap-screw 51, or other suitable means, to the interior of the end of the box and held against vertical displacement. The particular formation of the matrix face of this die will be presently further described. A slot 60 extends from this matrix face through the die in alinement with the guiding slot for plunger 40 and such face is grooved as at 61 and 62 to accommodate the intersecting stay-wire and strand. The movable die indicated at 63 is mounted in the end of a slide 70 by a vertically disposed dovetail connection 71. This slide is located within the box-like casting 25, the free end of which overhangs the beam 4 and is forked as at 72 to afford bearing for a shaft 73 to be presently further referred to. Upon this shaft is rigidly mounted a cam 74 which bears upon a trundle roll 75 mounted rotatably upon a transverse shaft 76 the ends of which are confined in horizontally disposed forked sides of the ends of the slide 70, while toggle links 77, 78 connect this shaft 76 to a pin 79 passed through the slide and a compression spring 92 holds the center of the toggles down approximately to the center line between the front and rear ends of the links. A bolt 93 held loosely in the bottom of the box 25 passes upwardly through a hole in an extension of the link-member 78ª, a set-screw 94 extending through the link-member and bearing upon the bottom of the box for the purpose of adjusting the degree to which the toggles lie off-center. The link 78 is connected to links 77 by an adjustable member 78ª pivotally connected to the links 77 by a pin 90 and a right-and-left-hand screw 91 connecting the members 78 and 78ª together. This screw affords means for adjusting the length between the shaft 76 and pin 79 for initial fitting and to take up the wear between the cam 74 and roll 75 and other parts of the operative connection between the shaft 73 and die 50. The forward movement of the die is effected by the cam acting through the roll and toggle links and the forward end of the latter bearing upon the inner forward face 80 of the slide; while the return movement is effected by a laterally movable bar 100 common to all the lock-formers. This bar will be hereinafter more fully described. The face of the matrices are formed as follows:—

The matrix 63 has a pair of curved grooves 64 co-acting with grooves 65 in the face of matrix 50 and a pair of grooves 66 and 67 in each matrix face accommodating the strand and stay-wire respectively; while the matrix face 63 has a pair of concavities 68 and 69 to accommodate the ends of the staple.

Before the staple can be formed a wire blank length must be cut and fed to position to be acted upon by the staple-forming plungers and the cutting thereof is done partially in advance of and partially simultaneously with the commencement of the staple-forming operation, the cutting being effected by a plunger 30 in shearing relation with a bushing 181 through which the wire is fed. This wire is hereinbefore referred to as a locking wire and is indicated at 180. After it is fed through the bushing 181 it passes between the pin 31 and the face of plunger 30 through a flared eye 182 in the cap 45 to a stop consisting of the overhanging end 183 of a small off-set bar 184 fastened to the cap over the eye, by screws 185. The feeding of this wire is done by a pair of feed rolls 200 mounted on shafts 201, 202 the former being driven by bevel-gears 203 common to the different lock formers and hereinafter further described in connection with the operating means common to the several lock-formers. These feed rolls are disposed to feed vertically, and located beneath and with their direction of feed in alinement with the bushing 181. They are supported in a bracket 210 secured to the bottom of the member 26. A bundle of this wire is contained in the usual holder not shown.

The pin 31 upon which the staple wire is bent to form the staple has its operating end 31ª reduced in width sufficiently to provide spaces at the top and bottom sides thereof and between it and the top and bottom walls of the groove or slideway 33 sufficient to accommodate the legs of the staple. This pin is operated by a bell-crank-lever 250 actuated in turn intermittently by a bar 249 secured by screws 251, for instance, to the widened portion of the plunger, such bar having fingers 252 and 253, these fingers engaging the protruding end 254 of the bell-crank-lever and shifting it and the pin upon each reciprocation of the plunger.

Each lock-former also has two pairs of

fingers 260, one pair being pivoted to the inside of the bottom of the box 25 on a pin 265 set rigidly therein, and the other pair is pivoted on a pin 266 set rigidly in a cover 267 fastened to the top of the box. The fingers of each pair overlap and have inclined faces 263 which are made to come together as the slide advances by the swinging of the fingers, and this is caused and the fingers made to open and close to a line intersecting the line of feed of the strand by cam slots 261 therein and pins 262 engaging the slots and carried by the slide 70. These fingers are for guiding the strand wire and bringing it into alinement with the matrix, an opening 270 in the bottom of the frame work 26 permitting the strand to pass, spliced portions of such strand being also accommodated and the woven fabric being permitted to swing free of the fixed die, as will be hereinafter shown. The stay wire 20 is guided in a guide consisting of an integral part 300 of the cover 45 and presenting a leaning standard 301 with a latch 302 pivoted thereto as at 303, such latch having a jaw 304 with an interior shoulder beveled as at 305, the jaw being grooved at 306, the end of the groove towards the direction from which the wire comes being flared as at 307 to facilitate the entry of the wire. The latch is yieldingly held closed by a spring 308 and bolt 309, the latter attached to the latch, and the spring bearing between a nut on the bolt and the standard. The wire is forced out of this groove by a cam carried (with as many more as may be required) upon and operated by a shaft 312 common to all of these cams and to be hereinafter alluded to. This cam consists of a plate 310 formed with a hub 311 fitting upon the shaft and secured thereto by a spline and set-screw 314. This shaft is driven from the shaft 212, and at the same speed as it, by sprocket-wheels 390 and chain 391. As will be presently shown, during the downward movement of the cam with the shaft it bears upon the stay-wire 20 and coacts with the other cams in forcing the wire into the matrices. For this purpose the bearing face of the cam is of a configuration to force the wire from the guides 306 to the matrices and before this action the predetermined length of stay wire is measured off and simultaneously with the commencement of the movement of the wire, it is severed.

This finishes the description of one of the lock-forming mechanisms, and as before mentioned there are six of such mechanisms all identically the same.

These lock-forming mechanisms are operated in unison by means common to all as follows:—The several feed devices (rolls 200, etc.) receive motion from the shaft 204 before mentioned, the motion being transmitted through the gears 203 also above mentioned and the shaft itself is driven by a train of gears 205, 206, 207, 208 and 209, the latter intermeshing with gear 122 before mentioned and through it and pinion 121 and shaft 120 from initial power represented by pulley 126. The gears 207 and 208 are mounted on one and the same stub shaft, the gear 206 on a different stub shaft, and the gear 205 on the shaft 204, and the gear 209 on a shaft 212 transmitting power to the stay-wire twisters to be hereinafter further alluded to.

The stay-wire is drawn from a coil (not shown) suitably located, and across the several lock-formers and through the guides 306 to position 20^b, and measured and cut off by the following means: Stay-wire 20 is supported and guided between the guides 306 of each lock-former by intermediate guides comprising brackets 600 having a member 601 corresponding to the standard 301, and having a latch 602, and coacting cams 610 on shaft 312. The severing of the stay-wire is done by a cutting tool 320 mounted rigidly upon a collar 1023 secured upon a shaft 312 and rotating in shearing relation with a stationary cutter 1321 counter-sunk in a bracket 322 and fastened thereto by a clamp 1322, the bracket being fastened to the frame member 2 by cap-screws 1324, a bushing 321 in the bracket serving as a guide for the wire which is drawn from a reel suitably located, by a yielding feed device.

This yielding feed-device consists of two pairs of feed-rolls 330—331 mounted in a carriage horizontally slidable on a slide 341 bolted to the lug 322, the carriage being constructed to partially enclose the slide, the edges of which are rabbeted and engaged by the enclosing edges of the carriage which are also rabbeted, as at 345. This carriage consists of a casting 340 and a plate 346 in the space between which the feed rollers and two pairs of driving gears 335 and 336 are mounted on pins 350, 351, 352, and 353, the opposite ends of the lower pins (351, 353), being diminished and set in holes in the casting and plate while the upper pins (350, 352) are secured in place by set-screws 360 by which may be secured adjustment to regulate the pressure of the rolls upon the wire. This carriage is caused to move in one direction by the feed rolls creeping along the wire during the interval that its progress is arrested by the operation of the cutting tool 320; and it is returned to its initial position by a cam 370 operated by shaft 175 upon which it is rigidly mounted, the cam acting on a roller 371 on the carriage. This creeping back of the carriage provides for a continuous rolling of the feed rollers along the wires, which has the advantage of obviating abrasion of and damage to the galvanized or plated surface of the wire. The end of the

shaft 312 upon which the cutting tool 320 is mounted is supported by bracket 322. The driving gears 335 and 336 of the feed-rollers 330 and 331 have hubs 337 upon which the rollers are mounted and such gears are driven by a pinion 338 mounted rigidly on a shaft 339 journaled in the carriage and having mounted rigidly upon one end thereof a sprocket-wheel 340 driven from a shaft 700 by a sprocket-wheel 701 and a sprocket-chain 702. This shaft is driven by a pinion 703 rigidly mounted thereon and a gear 704 wide enough of face to intermesh with the pinion 703 and a measuring gear 705 mounted rigidly on the shaft 175 (before mentioned). This gear 704, for the purpose of adjustment relatively to the gear 705, is mounted in a radial arm and face plate 706 pivoted on a hub 707 on a bearing bracket 708 having a pair of diametrically opposite lugs 709 carrying bolts 710 engaging a circular T-slot 711 in the back of the face-plate. This bracket is secured to the frame member 2.

The stay wire is cut to predetermined length by the master gear 705 producing in a single revolution, through the intermediate gear, the required peripheral travel of the feed rolls to feed the required and predetermined length or stay,

The combined coiling and tension devices are located in position to act upon such strand, and consist of a spindle 800 having a vertically elongated head 801 carrying a series of preferably four rollers 802 disposed in staggered relation. This spindle is mounted in a sleeve bearing 803 fastened to the lower beam 6 of the machine. The top and bottom rollers are mounted directly in the head 801, and the intermediate rollers on a swivel plate 805 adapted to be swung to a position at right angles to the head and thus place the intermediate rollers in position with the space therebetween in alinement with the axis of the spindle. This permits the wire to be readily threaded therethrough. A latch-pin 806 yieldingly retains the plate in its proper operating position and holes 807 afford means whereby the plate may be turned. It is preferable to have this coiling spindle run freely during the coiling operation and stop during the time the lock is being formed, a tensional effect is necessary however to take all slack out of the wire immediately before the dies clamp it, for the purpose of ensuring uniformity of length of the strands. Without the application of tension the respective wires would have different degrees of slackness and consequently they would be of different lengths. In order to provide the necessary tension at the required time, I have designed a particular driving mechanism for the spindles, consisting of a series of spiral gears 850 mounted rigidly on the series of spindles beneath the bearings 803 and a series of spiral gears 851 intermeshing with 850 and carried by a shaft 852. This shaft is journaled in the frame members 2 and 3 in a series of lugs 853 a pair of which are cast integrally with each bearing, and it is driven from the initial driving shaft 120 by sprocket-wheels 855 856 and chain 857. The sprocket-wheel on shaft 852 is operatively connected to the shaft by a friction clutch 860 having a brake 861 combined therewith in such a manner that when the clutch is thrown out the brake is thrown-in. This action is brought about by a cam 862 on shaft 175 and operating a lever and rod mechanism 863 which in turn operates the clutch (and simultaneously the brake), the clutch being thrown in simultaneously with commencement of the elevation of the woven fence fabric, and thrown out slightly in advance of the finish of the elevation. The effect of this throwing-out of the clutch at this particular time is that the wires are held and the required tension is imparted thereto to ensure uniformity of length of the several strands about to be locked. Another function of the tension is that when the take-up (to be presently described) operates, the relative arrangement of the parts and holding of the lower ends of the strands throws the locked intersections of the woven fabric out of the fixed matrix. This movement of the fabric is accommodated by the opening 270 in the bottom of the frame of the machine. The use of this combined coiler and tension mechanism is rendered possible by the presence in the machine of the centralizing fingers 260 which overcome the tendency of the spiral wires to deflect from the grooves 66 in the matrices and springs them into line.

The top and bottom strands have the ends of the stay-wires twisted around them by means of twisters each consisting of a coiling head 900 having an axial bore 901 of a size to fit the strand wire moderately closely but with freedom to slip through it. This bore is extended laterally in the form of a widened chamber 902 the inner wall of which is inclined outwardly. The strand wire passes upwardly through the bore, and the splices, of which there is usually one at the end of each bundle of wire are accommodated by the chamber 902 the inclined wall deflecting the splice out of the bore. This head is mounted in the upper end of a hollow shaft 903 to which it is secured by a pair of screws 904 and 905; such shaft being journaled in a bracket 906 bolted to the table 4 of the machine frame, and it is rotated by a spiral gear 907 mounted rigidly thereon and intermeshing with a second spiral gear 908 mounted in the before-mentioned shaft 212. The head has a radial hook 909, and the inner end of the hook is terminated suffi-

ciently short of the bore to provide the necessary clearance for the stay-wire. The top of the bracket has a pair of standards or vertical lugs 1001 and 1011 corresponding with the standard 301 and leaning slightly away from the axial line of the coiling head for the purpose of accommodating and forming clearance for the elevation of the stay as the woven fabric is drawn upwardly. Two pairs of cams of the same nature as the before-mentioned cams 310 are mounted, one pair at each margin wire of the fence, and they all work in conjunction with standards 1001 and 1011 and have for their function to depress the stay-wires, each of the standards having one of the spring latches 302 carried thereby and operating in the same manner as those before mentioned. In order to give a lead to the spiral formation of the coil, the end of the stay-wire to be coiled is supported on a level with the horizontal grooves 67 in the dies 50, by an inclined bottom or seat 1005 between the leaning standard 1011 and a pair of vertical lugs 1006 located opposite to the standard 1011. The pair of these cams farthest from the feed rolls 330, 331, are indicated at 1010 and 1012, the cams 1010 being arranged contiguous to the inner faces of 1011 and 1006 and the other cam 1012 contiguous to the standard 1001, both cams being in position to act upon the end to be coiled and bend it down to lie across the top of the head and in the path of the revolving hook. The top of the head is of conical form and in order to cause the bent-down end of the stay-wire to assume a position lying along the surface of this cone and in the path of the hook the cam 1010 is shorter than 1012 and has its end rounded off concentric with the pivot of the cam and of a length to depress the stay-wire end to the required extent; and the cam 1012 is of sufficiently greater length to supplement the cam 1010 in its action. The pair of cams nearest to the feed rolls are indicated at 1020 and 1021, the cam 1020 being structurally the same in all respects as cam 1010 excepting that its shape is reversed and it is made right-hand instead of left-hand. The cam 1021 consists of a curved finger secured to a collar 1023 mounted on shaft 312, the function of which is to carry this cam and cutter 320 before mentioned. The action of these cams and the cams 310 before mentioned is simultaneous, and the hook 909 so timed in its action to meet the stay-wire end immediately after it has been bent down to the conical surface.

A bar 100 common to all the lock-formers rests slidably on the beam 4 and engages a lug 101 on the underside of the slide. This bar is made to operate in unison with the cam 74 by a pair of cams 102 also mounted on shaft 73 and engaged by trundle rolls 103 carried by arms 104 fastened to the bar 100. These cams 102 co-act with the cams 74 as double leaders in imparting the required intermittent reciprocative operation to the die 50. This shaft 73 is driven from a driving shaft 120 (the initial source of power in the machine) through a train consisting of a pinion 121, gear 122, pinion 123, and gear 124 on such shaft 73, the gear 122 and pinion 123 being mounted on an intermediate shaft 125; and the driving shaft derives its power from any available source by a combined fly-wheel and pulley 126, belt 1260 and pulley 1261 and counter-shaft 1223.

The plungers 30 and 40 are operated by a pair of slide-bars 150, 151 connected to the several plungers by connecting rods 152, 153, the end of rod 152 being formed with a vertical pin 154 engaging a hole 155 in the cross-head 43 and the end plunger 30 is forked to receive the end of rod 153 the connection being made by a pin 156. The connection between the opposite ends of the rods and the slide-bars is effected by pins 157 and 158. These slide-bars are actuated in the operation of cutting the blank forming the staple and forming the lock from the staple by cams 160, 161 through slides 162, 163 in the form of frames enclosing the cams and carrying rollers 164, 165 bearing upon the cams, the return movement being imparted by cams 167, 168 and rollers 169, 170; while the connection between the slide-bars and slides 162, 163 consists of engaging hooks 171, 172, formed respectively on the slide-bars and slides. These slides 162, 163 are guided in the slideways 2^a and are prevented from upward displacement by the cap 2^b. These cams 160, 161, 167 and 168 are mounted rigidly upon a shaft 175 having power transmitted thereto from the shaft 73 through mitre-gears 176 and 177.

Heretofore there has been considerable disadvantage experienced in collecting the woven fabric as it left the machine, owing to the fact that the winding up or rolling of the fabric was of necessity done intermittently. Another disadvantage was experienced from the increasing diameter of the roll being wound, owing to the fact that the winding drum was caused to exert its pull directly upon the fabric in the machine, the variation in pull due to the increasing diameter being neutralized by a manual adjustment. According to my invention the variation in pull of the wind-up is automatically neutralized by a constant speed pulling-roll; and means intermediate of the pulling roll and the fabric in the machine takes up sufficient fabric to feed the continuously rotating pulling roll during the time the fabric is held stationary by the clamping action of the dies. The constant speed pulling roll is grouped with a wind-up roll 1201 and a roll 1202 to increase

the extent to which the web or fabric indicated at 1205 is wrapped around the pulling roll. This latter roll (1200) is driven constantly by sprocket wheels 1206 and 1207 and chain 1208, shaft 1210, pinion 1209 and gear 1211 and the wind-up roll 1201 is driven by a belt 1220 looped around pulleys 1221 and 1222 the former on the counter shaft 1223, before mentioned, and the latter carried by the frame 1224 in which these rollers are mounted and driving a pinion 1225 intermeshing with a gear 1226 driving the roll 1201. In order to accommodate fabrics with differently spaced stay-wires the shaft 1210 is mounted in an adjustable bearing 1212 clamped in place by screws 1213 and adjusted by screw 1214. The take-up mechanism consists of a drum 1230 mounted rigidly on a shaft 1231 journaled in a pair of boxes 1232 in vertical slideways 1233 formed on the upper ends of a pair of standards 1234 braced by stays 1235 and 1236. The shaft-ends extend through the boxes and have connecting rods 1237 mounted thereon and provided at their lower ends with trundle rollers 1238 which bear upon cams 1239 mounted rigidly on shaft 73. The rollers and ends of the connecting rods are mounted on a pair of shafts 1243 journaled in boxes 1240 guided in slideways 1241. The cams are timed to raise the drum during the period the dies are open and permit it to fall during the period the dies are closed. The fabric is looped over this drum.

This completes the detailed description of the machine, and in order to facilitate the ready understanding thereof I will now set forth briefly the manner in which it operates.

Operation.

The strand wires 12, 14, and 15 are first threaded upwardly through the coilers 802, the marginal strands 12 and 14 through the twisters 900 and the intermediate strands 15 through holes 270 in the frame of the locking mechanism and between the lock-forming dies 50 and 63 of the various lock-forming mechanisms. From these mechanisms and twisters they are all taken over drum 1230 and around the pulling-roll 1200 and roll 1202 to the wind-up roll 1201 to which latter they are fastened. The stay wire is then threaded between the feed rolls 330 and 331, through bushing 321 over cutter 1321 and through the guides 306 until the required length for a stay 20 is provided. The locking wire 180 is then inserted between feed rolls 200 and through bushing 181 to the stop 183. The machine may now be started, and the first action is the seizing of the stay wire by the cutters. Simultaneously with operation of the cutter the cams 310 depress the stays from the position 20^c to position 20^b (Fig. 5). Also practically simultaneously, each of the plungers 30 (Figures 14, 15, 16 and 17) advances in shearing relation with the bushing 181 in its particular lock-forming mechanism and cuts off a staple-length, and continuing to advance forms the staple, as shown in Figures 14 and 15, by folding the ends over the pin 31 previously inserted in the path of the blank. Just before the plunger reaches the end of its stroke, the finger 253 (Fig. 15) operates the bell-crank lever 250 thus withdrawing the pin 31. Immediately following the withdrawal of the pin the second plunger 40 advances and drives the staple ahead of it towards the dies. Just before the forward ends of the staple 180 pass through the hole 60 the die 63 is brought into contact with the die 50 by means of cam 74, roller 75, and slide 70. Continuing in its forward movement the plunger 40 drives the staple into the matrix thus forming the lock. Simultaneously with the depression of the stays 20 by cams 310 to the position 20^c, the ends of the stays are depressed by the cams 1010, 1012, and 1021, thus bringing the ends into the path of the fingers 909 by which these ends are engaged and twisted or coiled as at 1909 around the marginal strand 14 (Figs. 27, 28, 29, 30, 31, 32, 33, and 34). Each coiler or twister is so timed as to engage the end of the stay immediately it is depressed. The lock-forming step and twisting or coiling step are simultaneous, and the matrices are opened immediately the lock is formed. The operation thus far described completes the weaving of the fabric, and the elevation and the winding up of the latter is the final step. This elevation and winding up is caused by the rotation of the drums 1200, 1201, 1202 and reciprocation of the drum 1230, the latter being operated by cams 1239, and the function thereof being to take-up sufficient length of strands to permit them to be held stationery in the dies from the time the dies are closed until they are opened again. It must be understood that the pulling drum 1200 rotating continuously at uniform speed in unison with the machine, must be supplemented by means for feeding the fabric to the drum during the stationary period. This is done by the elevation of the drum 1230 and consequently the taking up of the fabric during the time the dies are open, and the lowering of the drum and consequently the feeding fabric during such stationary period. During this elevation of the fabric the strands are pulled through the coilers 805 and coiled. In order to obtain a uniformity of position of the curves produced by the coilers relatively to the stays, the coilers are driven in unison. Just previous to the commencement of elevation of the fabric, the cam 862 through the intermediate mechanisms described operates the clutch 860 and brings the shaft 852 and conse-

quently the coilers into action. Before the elevation is completed the mechanism 863 (Figs. 1, 4, and 6) throws out the clutch and throws in the brake, thus stopping the coilers while the fabric is still being elevated and causing them to act as tension devices. A feature of this operation, due of course to the novel construction and combination of parts before described, is that the lock-forming wire is fed in a line parallel to the strands with the advantage that they (the lock-forming wires) avoid all obstructions; and the staple struck therefrom is maintained until final formation in the same plane in which it is formed, with the advantage of simplicity of construction and operation of the machine.

The gear 705 is so cut that each tooth produces one-quarter of an inch travel of the periphery of the feed rolls 330 and 331, thereby enabling a predetermined length of stay wire to be fed during the interval between the times the cutter 320 passes through the line of the wire (indicated at 20, see Fig. 25).

What I claim is as follows:—

1. In a wire fence machine, the combination with means whereby the strands are caused to travel through the same, and means for feeding the stay-wires across the strands, of lock-wire feeding mechanism, combined means for cutting a predetermined length from the fed lock-wire and partially forming said length into a wire-lock, means for completing the wire-lock at one of the intersections of a strand and stay-wire; means for feeding the lock-forming wire in a direct line to the said means for partially forming the lock; and means for feeding the partially formed lock in a direct line from the means for partially forming it to the said lock-completing means.

2. In a wire fence machine, the combination with means whereby the strands are caused to travel through the same, and means for feeding the stay-wires across the strands, of lock-wire feeding mechanism, combined means for cutting a predetermined length from the fed lock-wire and partially forming said length into a wire-lock, means for completing the wire-lock at one of the intersections of a strand and stay wire; means for feeding the lock-forming wire in a direct line to the said means for partially forming the lock; means for feeding the partially-formed lock in a direct line from the means for partially forming it to the said lock-completing means, and means for guiding or controlling the partially formed lock during transit to the lock-completing means.

3. In a machine of the type described, the combination with a stationary wire-cutting member and a reciprocatory wire-working member; of a member movable in a direction at an angle to the direction of movement of the said wire-working member and adapted to successively coact with the cutting member and wire-working member, for the purpose set forth.

4. In a machine for producing wire fabric, the combination with a machine frame having a pair of spaced tables; of a series of horizontal lock-formers extending from one table to the other table and being mounted thereon, means for adjusting said lock-formers relatively to each other, and operating means common to the lock-formers.

5. A machine for producing wire fabric comprising in combination, means whereby the strands are caused to travel through the machine; means for feeding stay-wires across the strands; means feeding lock-wire to the machine in a plane extending parallel to the direction of travel of the strands, means for cutting predetermined lengths from the lock-wire; means coacting with the cutting means for forming the cut wire into a staple; means whereby the staple thus formed is guided or controlled and advanced, while lying in the same horizontal plane in which it is formed, to position engaging the intersection of the wires; and means whereby a lock is formed from the said staple and simultaneously caused to lock the intersection of a pair of wires.

6. A machine for producing wire fabric comprising in combination, means whereby the strands are caused to travel through the machine; means for feeding stay-wires across the strands; means feeding lock-wire to the machine, means for cutting predetermined lengths from the lock-wire; means coacting with the cutting means for forming the cut wire into a staple; means whereby the staple thus formed is guided or controlled and advanced, while lying in the same plane in which it is formed, to position engaging the intersection of the wires; and a series of independently carried and relatively adjustable lock-forming mechanisms whereby a lock is formed from the said staple and simultaneously caused to lock the intersection of a pair of wires.

7. In a machine for producing wire fabric, the combination with a supporting frame, of a lock-former secured rigidly to the frame and comprising a carrier having an angular extension presenting a slide-way, lock-forming dies within the carrier, a staple-forming plunger contained in the slideway, means for reciprocating the plunger, a second plunger coacting with the staple-forming plunger and adapted to force the staple into the dies; means for feeding strand wire and stay-wire through the dies in directions at right angles to each other, means for projecting locking-wire across the guide in advance of and contiguous to the forward end of the first-mentioned plunger, and an intermittently reciprocating pin intersecting the path of the

second-mentioned plunger and straddled by and coacting with the first-mentioned plunger in the formation of the staple, and means for intermittently reciprocating the said pin in unison with the said plunger.

8. In a machine for producing wire fabric, the combination with a supporting frame, of a lock-former secured rigidly to the frame and comprising a carrier of box-like form having an angular extension of substantially inverted T-form presenting a slide-way, lock-forming dies within the carrier, a staple-forming plunger contained within the slideway, means for reciprocating the plunger, a second plunger coacting with the staple-forming plunger and adapted to force the staple into the dies; means for feeding strand wire and stay wire through the dies in directions at right angles to each other, means for projecting locking-wire across the guide in advance of and contiguous to the forward end of the first-mentioned plunger, and an intermittently reciprocating pin intersecting the path of the second-mentioned plunger and straddled by and coacting with the first-mentioned plunger in the formation of the staple, and means for intermittently reciprocating the said pin in unison with the said plunger.

9. In a machine for producing wire fabric, the combination with a supporting frame, of a lock-former secured rigidly to the frame and comprising a carrier having an angular extension presenting a slide-way, lock-forming dies within the carrier, a staple-forming plunger contained within the slideway and consisting of a member of oblong cross-section and provided with a longitudinal groove, means for reciprocating the plunger, a second plunger coacting with the staple-forming plunger and adapted to force the staple into the dies; means for feeding strand wire and stay wire through the dies in directions at right angles to each other, means for projecting locking-wire across the guide in advance of and contiguous to the forward end of the first-mentioned plunger, and an intermittently reciprocating pin intersecting the path of the second-mentioned plunger and straddled by and coacting with the first-mentioned plunger in the formation of the staple, the said pin being slidably located in the groove of the first-mentioned plunger, and means for intermittently reciprocating the said pin in unison with the said plunger.

10. In a machine for producing wire fabric, the combination with a supporting frame, of a lock-former secured rigidly to the frame and comprising a carrier having an angular extension presenting a slideway, lock-forming dies within the carrier, a staple-forming plunger contained within the slideway and consisting of a member of oblong cross-section and provided with a longitudinal groove, means for reciprocating the plunger, a second plunger coacting with the staple-forming plunger and adapted to force the staple into the dies; means for feeding strand wire and stay wire through the dies in directions at right angles to each other, means for projecting locking-wire across the guide in advance of and contiguous to the forward end of the first-mentioned plunger, and an intermittently reciprocating pin intersecting the path of the second-mentioned plunger and straddled by and coacting with the first-mentioned plunger in the formation of the staple, the said pin being slidably located in the groove of the first-mentioned plunger, and means for intermittently reciprocating the said pin in unison with the said plunger consisting of a bell-crank lever and an operative connection between the same and the plunger.

11. In a machine of the type described, the combination with a machine frame, means for causing a strand to travel through the machine, and an intermittently operating lock-forming mechanism, of means adapted to feed lock-wire to said mechanism in a plane parallel to the direction of travel of the strand, said means consisting of a plurality of feed rolls, and means for operating said rolls during the interval between each operation of the lock-forming mechanism.

12. In a machine of the type described, the combination with a machine frame and means for feeding a lock-wire therethrough; of lock-wire cutting mechanism, and a bushing mounted in the machine frame and adapted to guide the wire to the said mechanism, said cutting mechanism consisting of a plunger having a pair of oppositely disposed tongues slidably mounted in grooves in the machine frame, one of said tongues being adapted during operation to move in shearing relation with the bushing and across the wire.

13. In a machine of the type described, the combination with a machine frame and means for feeding a lock-wire therethrough; of means for cutting predetermined lengths from the lock-wire, consisting of a stop upon the machine frame, a guide for the wire to the stop, said stop consisting of an off-set bar the overhanging end of which intercepts the fed wire, and a member adapted to move in shearing relation with said guide and across the wire.

14. In a machine of the type described, the combination with a machine frame, lock-wire feeding mechanism, means for cutting predetermined lengths from the fed wire, lock-forming means, and means for forming a staple from each of said lengths; of means for feeding the staple to said lock-forming means, said last-mentioned feeding means consisting of a plunger-bar mounted in the

staple-forming means and adapted to move to and from the lock-forming means, and means for actuating said plunger-bar.

15. The combination with an intermittently operating wire working mechanism, of means for feeding wire to the mechanism consisting of a pair of continuously rotating feed rolls, and means whereby the feeding means recedes along the wire during the period of operation of the said mechanism and returns to working position during intermissions between periods of operation.

16. The combination with an intermittently operating wire cutting mechanism, of means for feeding wire to the said mechanism consisting of a pair of continuously rotating feed rolls, means whereby the feeding means recedes along the wire during each cutting operation of said mechanism, and means for returning said feeding means to initial position during the interval between each cutting operation.

17. The combination with an intermittently operating wire cutting mechanism, of means for feeding wire to the said mechanism consisting of a pair of continuously rotating speed rolls, means whereby the feeding means recedes along the wire during each cutting operation of said mechanism, and cam mechanism for returning said feeding means to initial position during the interval between each cutting operation.

18. In a machine of the type described, means for feeding stay-wire therethrough, lock-forming mechanism, means for retaining the wire in position above and registering with the lock-forming mechanism, means for cutting predetermined lengths from the wire during operation of the lock-forming mechanism, and cam mechanism for releasing and lowering the severed length to the retaining mechanism.

19. In a machine for producing wire fabric, the combination with an intermittently operating wire cutting mechanism, of constantly operated means for feeding wire to said mechanism, said means consisting of a plurality of continuously rotating rolls mounted upon a reciprocatory carriage, said carriage being adapted to move along the wire during each cutting operation of said mechanism, and means for returning said carriage to initial position consisting of a continuously rotating cam and a roller mounted upon said carriage and distinct from said plurality of rolls and adapted to be acted upon by said cam.

20. In a machine of the type described, the combination with a machine frame and an intermittently operating wire cutting mechanism, of constantly operated means for feeding wire to said mechanism, said means consisting of a plurality of rolls carried by a reciprocatory carriage and a slide bolted to a lug upon the machine frame for supporting the carriage, said carriage consisting of a casting and a plate spaced apart, a plurality of gears mounted in the space therebetween and adapted to drive said plurality of rolls, and means for adjusting said rolls relatively to the wire being fed, said carriage being adapted to move along the slide during each cutting operation of the said mechanism, and means for returning said carriage to initial position.

21. The combination with a machine for producing wire-fabric, of a rotary combined coiler and tension device and means for causing a strand wire to travel through said device.

22. The combination with a machine for producing wire-fabric, of a combined coiler and tension device, including a coiling spindle and means for intermittently driving the spindle for the purpose of imparting tension to the strand wire of the fabric.

23. The combination with a machine for producing wire-fabric; of a combined coiler and tension device, including a coiling spindle, means for driving the spindle, and cam-actuated mechanism rendering the driving means intermittent in action for the purpose of imparting tension to the strand wire of the fabric.

24. The combination with a machine for producing wire-fabric; of a combined coiler and tension device, including a coiling spindle, means for driving the spindle, and cam-actuated clutch and brake mechanism rendering the driving means intermittent in action for the purpose of imparting tension to the strand wire of the fabric.

25. In a machine for producing wire fabric and having lock formers, the combination with continuously operated wind-up mechanism and reciprocatory take-up mechanism adapted to facilitate the winding-up of the fabric independently of the wind-up mechanism, of intermittently operating tension mechanism coacting with the take-up mechanism for releasing the fabric from the lock formers.

26. In a machine for producing wire fabric and having lock formers, the combination with continuously operated wind-up mechanism and reciprocatory take-up mechanism adapted to facilitate the wind-up of the fabric, said take-up mechanism being movable independently of the wind-up mechanism, of intermittently operating coiling and tensional mechanism coacting with the take-up mechanism for releasing the fabric from the lock formers, and means for centralizing the spiral wires relatively to the lock formers.

27. In a machine for producing wire fabric and having lock formers, the combination with take-up mechanism for the fabric, of intermittently operating coiling and ten-

sional mechanism coacting with the take-up mechanism for releasing the fabric from the lock formers, and means for centralizing the spiral wires relatively to the lock formers, the centralizing means consisting of a slide, a pair of pivoted fingers, and an operative connection between the slide and fingers whereby the latter are caused to engage and guide the wire.

28. In a machine for producing wire fabric and having lock formers, the combination with take-up mechanism for the fabric, of intermittently operating coiling and tensional mechanism coacting with the take-up mechanism for releasing the fabric from the lock formers, and means for centralizing the spiral wires relatively to the lock-formers, the centralizing means consisting of a slide, a pair of overlapping fingers, and an operative connection between the slide and fingers whereby the latter are caused to engage and guide the wire.

29. In a machine for producing wire fabric and having lock-formers, the combination with take-up mechanism for the fabric, of intermittently operating coiling and tensional mechanism coacting with the take-up mechanism for releasing the fabric from the lock-formers, and means for centralizing the spiral wires relatively to the lock formers, the centralizing means consisting of a slide, a pair of pivoted overlapping fingers having inclined faces, and an operative connection between the slide and fingers whereby the inclined faces of the latter are caused to engage and guide the wire.

30. In a machine for producing wire fabric, the combination with a lock-former having a box 25 with cover 267 and slide 70 therein, and means for causing a strand wire to travel through the lock-former, of a pair of centralizing overlapping fingers having inclined faces pivoted to the inside of the bottom of the box, and a second pair of centralizing overlapping fingers pivoted to the cover and having inclined faces, and an operative connection between the fingers and slide whereby the inclined faces of the fingers are caused to engage and guide the wire.

31. In a machine for producing wire fabric, the combination with a lock-former having a box 25 with cover 267 and slide 70 therein, and means for causing a strand wire to travel through the lock-former, of a pair of centralizing overlapping fingers having inclined faces pivoted to the inside of the bottom of the box, and a second pair of centralizing overlapping fingers pivoted to the cover and having inclined faces, and an operative connection between the fingers and slide whereby the inclined faces of the fingers are caused to engage and guide the wire, the said operative connection consisting of cam-slot and pin formation.

32. In a machine for producing wire fabric having means for forming wire staples and means for forming locks from the staples, the combination of a series of rotary coilers including a coiling spindle and means for driving the spindle, and means whereby the strands of the fabric are acted upon by the coilers for the purpose of imparting spiral form to the strands.

33. In a machine for producing wire fabric having means for forming wire staples and means for forming locks from the staples, the combination of a series of coilers including a coiling spindle and means for driving the spindle, means whereby the strands of the fabric are acted upon by the coilers for the purpose of imparting spiral form to the strands, brake mechanisms, and means whereby the brake mechanisms control the coilers and cause them to apply tension to the strands.

34. In a machine for producing wire-fabric consisting of strands and stay-wires, the combination with lock-formers lying in the plane of the fabric, of staple formers embodying means for forcing the staples into the lock-formers upon a line intersecting the plane of the fabric at right angles to the same and at an angle of approximately forty degrees to the stay-wires.

35. In a machine for producing wire fabric consisting of strands and stay-wires, the combination with lock-formers lying in the plane of the fabric, of staple formers embodying means for forcing the staples into the lock-formers upon a line intersecting the plane of the fabric at right angles to the same and at an angle of approximately forty degrees to the stay-wires, and means for guiding the staples to straddle the stay-wires when engaging the wires of the fabric.

36. In a machine for producing wire fabric, the combination with a series of parallel reciprocating members of the machine, of a unitary reciprocating member disposed obliquely to the line of the series, and means operatively connecting the unitary members to the series of members whereby the said series of members are operated in unison.

37. In a machine for producing wire fabric, the combination with two series of parallel reciprocating members of the machine, of a pair of unitary reciprocating members disposed obliquely to the line of the series, and means operatively connecting the unitary members to the respective series of members whereby the members of each series are operated in unison.

38. In a machine for producing wire fabric, the combination with means for delivering the fabric from the machine, of two series of parallel reciprocating machine members and a pair of unitary reciprocating members disposed parallel to the stay-wires of the fabric, and means operatively connecting the unitary members to the re-

spective series of members whereby the members of each series are operated in unison.

39. In a machine for producing wire fabric, the combination with a series of slideways and a series of devices feeding wires to the slideways, a series of plungers within the slideways, a series of intermittently reciprocatory pins operating to and from intersecting relation with the slideways in advance of the plungers, means for operating the pins, the said plungers being constructed and arranged to straddle the pins, a reciprocatory operating member disposed obliquely to the line in which the plungers lie, and means operatively connecting the said member to the plungers whereby the latter are operated in unison.

40. In a machine for producing wire fabric, the combination with a series of slideways and a series of devices feeding wires to the slideways, a series of plungers within the slideways, a series of intermittently reciprocatory pins operating to and from intersecting relation with the slideways in advance of the plungers, means operatively connecting the series of pins to the series of plungers, the said plungers being constructed and arranged to straddle the pins, a reciprocatory operating member disposed obliquely to the line in which the plungers lie, and means operatively connecting the said member to the plungers whereby the latter are operated in unison.

41. In a machine for producing wire fabric, the combination with a series of lock-forming dies and means operating the same, a series of slideways terminating at the dies and a series of devices feeding wires to the slideways, a series of intermittently reciprocatory pins operating to and from intersecting relation with the slideways in advance of the plungers, a pair of plungers in each slideway, one of such plungers being constructed and arranged to straddle the pin in its slideway and coact therewith in forming a staple and the other plunger being carried and guided by the staple forming plunger and constructed and arranged to force the staple into the dies, means operatively connecting the series of pins to the staple propelling plungers, a pair of parallel reciprocatory bars disposed obliquely to the line in which the plungers lie, means operatively connecting the said bars to the plungers, and means for operating the said reciprocatory bars alternately.

42. In a machine for producing wire fabric, the combination with fixed and movable lock-forming dies, a slide having the movable die secured thereto, means for reciprocating the slide, toggle mechanism operatively connecting the operating means to the slide, and a spring retaining the toggles in operating position and permitting the toggles to fold and the movable die to yield upon meeting an obstruction.

43. In a machine for producing wire fabric, the combination with fixed and movable lock-forming dies, a slide having the movable die secured thereto, a cam, a pair of toggle links connected at one end to the slide and carrying at the other end a trundle roll engaging the cam, a compression spring holding the center of the toggles at approximately the center line between the ends of the said toggles, and means coacting with the cam for reciprocating the slide.

44. In a machine for producing wire fabric, the combination with a series of lock-formers each including fixed and movable dies, a slide having the movable die secured thereto, a cam, toggle mechanism operatively connecting the cam to the slide, and a spring retaining the toggles in operating position and permitting the toggles to fold and the movable die to yield upon meeting an obstruction, and unitary operating means coacting with the series of cams in imparting reciprocal motion to the slides.

45. In a machine for producing wire fabric, the combination with a series of lock-formers each including fixed and movable dies, a slide having the movable die secured thereto, a cam, toggle mechanism operatively connecting the cam to the slide, and a spring retaining the toggles in operating position and permitting the toggles to fold and the movable die to yield upon meeting an obstruction, a lateral movable bar coacting with the series of cams in imparting reciprocal motion to the slides, and means for vibrating the bar.

46. In a machine of the type described, the combination with stay-wire feeding mechanism, intermittently operating lock-forming mechanism, and means for cutting a predetermined length from the fed wire; of means for moving the length to the lock-forming mechanism during the interval between each operation of said lock-forming mechanism, said means consisting of a continuously rotating shaft, a plurality of cams mounted thereon, and means for rotating said shaft.

47. In a machine for producing wire fabric, the combination with means for stretching the top and bottom strands of the fabric, of means for twisting the ends of the stay-wire around such strands, consisting of conical coiling heads each having an integral upwardly projecting radial hook adapted to engage the end of the stay-wire, and means for rotating such heads and causing them when the coiling heads are rotated to twist the stay-wire ends around the strands.

48. In a machine for producing wire fabric, means for causing strand wires to travel through the machine, said wires having

splices therein, the combination with means for stretching the top and bottom strands of the fabric, of means for twisting the ends of the stay-wire around such strands, consisting of coiling heads, each having an axial bore extending laterally in the form of a widened chamber the inner wall of which being inclined for the purpose of deflecting the splices and of the bore, an integral upwardly projecting radial hook adapted to engage the end of the stay-wire, and means for rotating such heads with the strands threaded therethrough and causing them to twist the stay-wire ends around the strands.

In testimony whereof I have signed my name to this specification in the presence of two witnesses.

ARTHUR E. BLASHILL.

Witnesses:
E. R. PITTS,
GORDON G. COOKE.