J. W. SNEDEKER.

OPEN MESH FABRIC MAKING MACHINE.

APPLICATION FILED JULY 27, 1916.

1,243,353.

Patented Oct. 16, 1917.

6 SHEETS—SHEET 1.

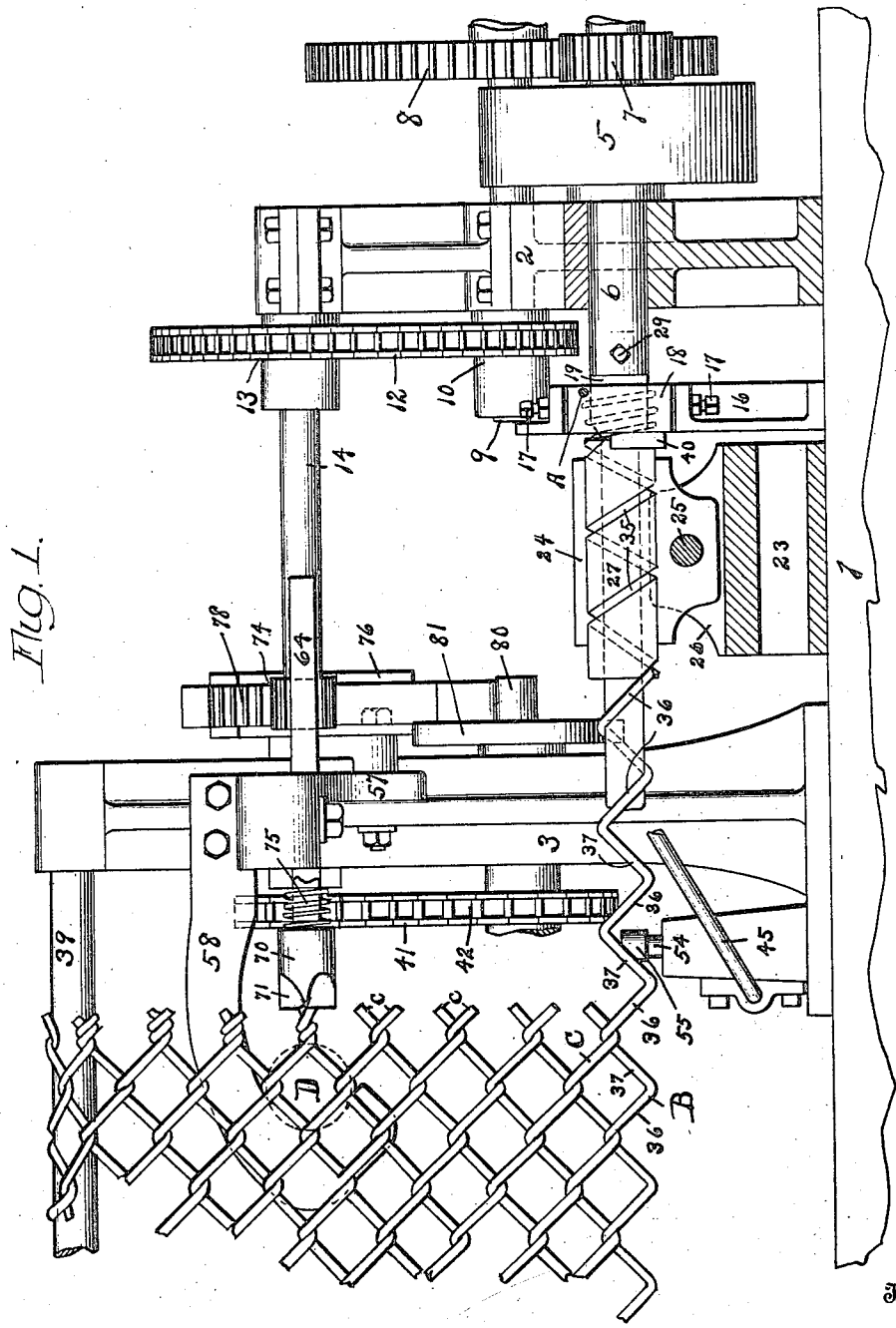


Fig. 1.

Witness

L. W. Patee.

Inventor

James W. Snedeker.

By Pagelsen and Spencer

Attorneys.

J. W. SNEDEKER.

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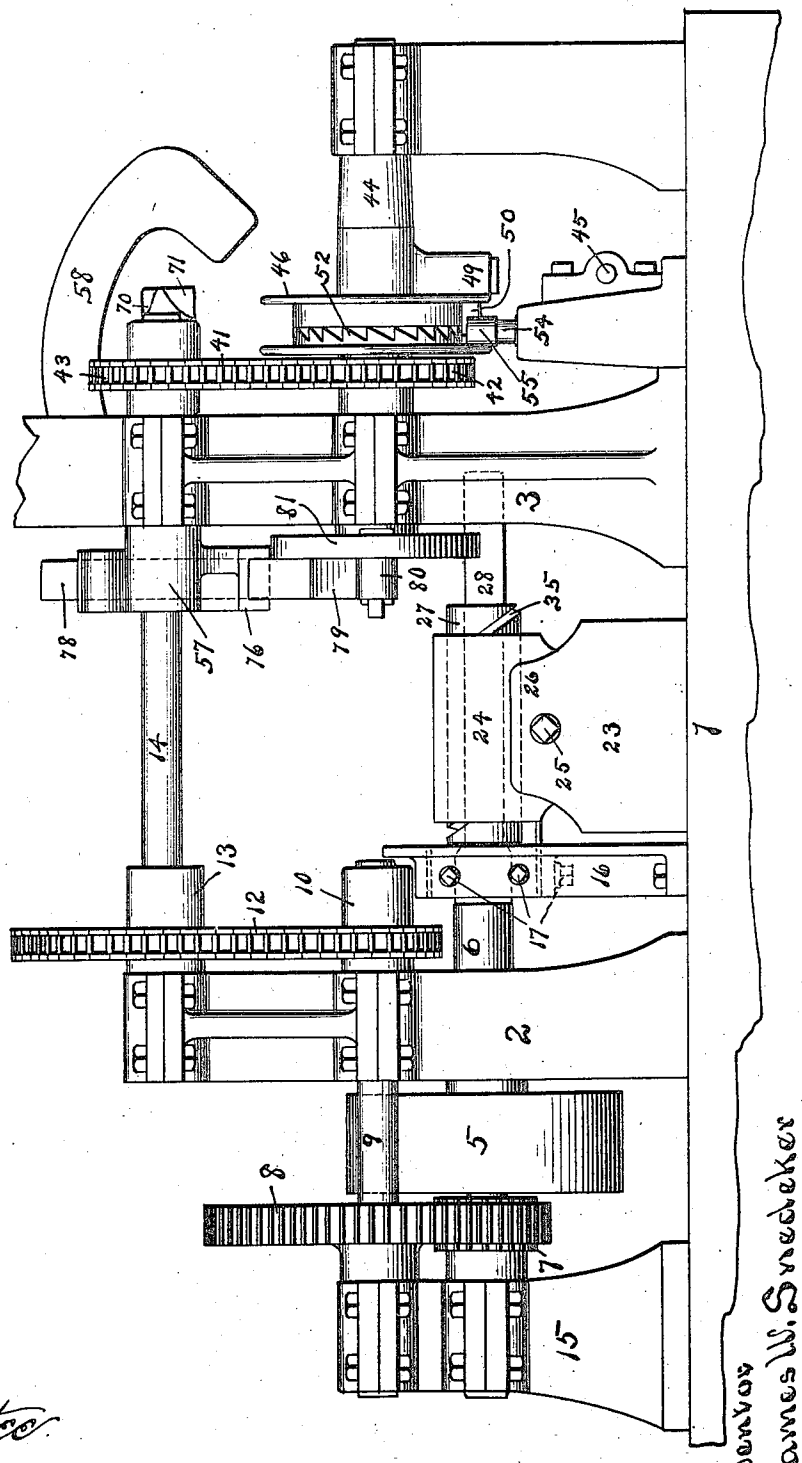


Fig. 2.

Witness
L. W. Pateo

Inventor
James W. Snedeker
By Pagelsen and Spencer, Attys.

J. W. SNEDEKER.

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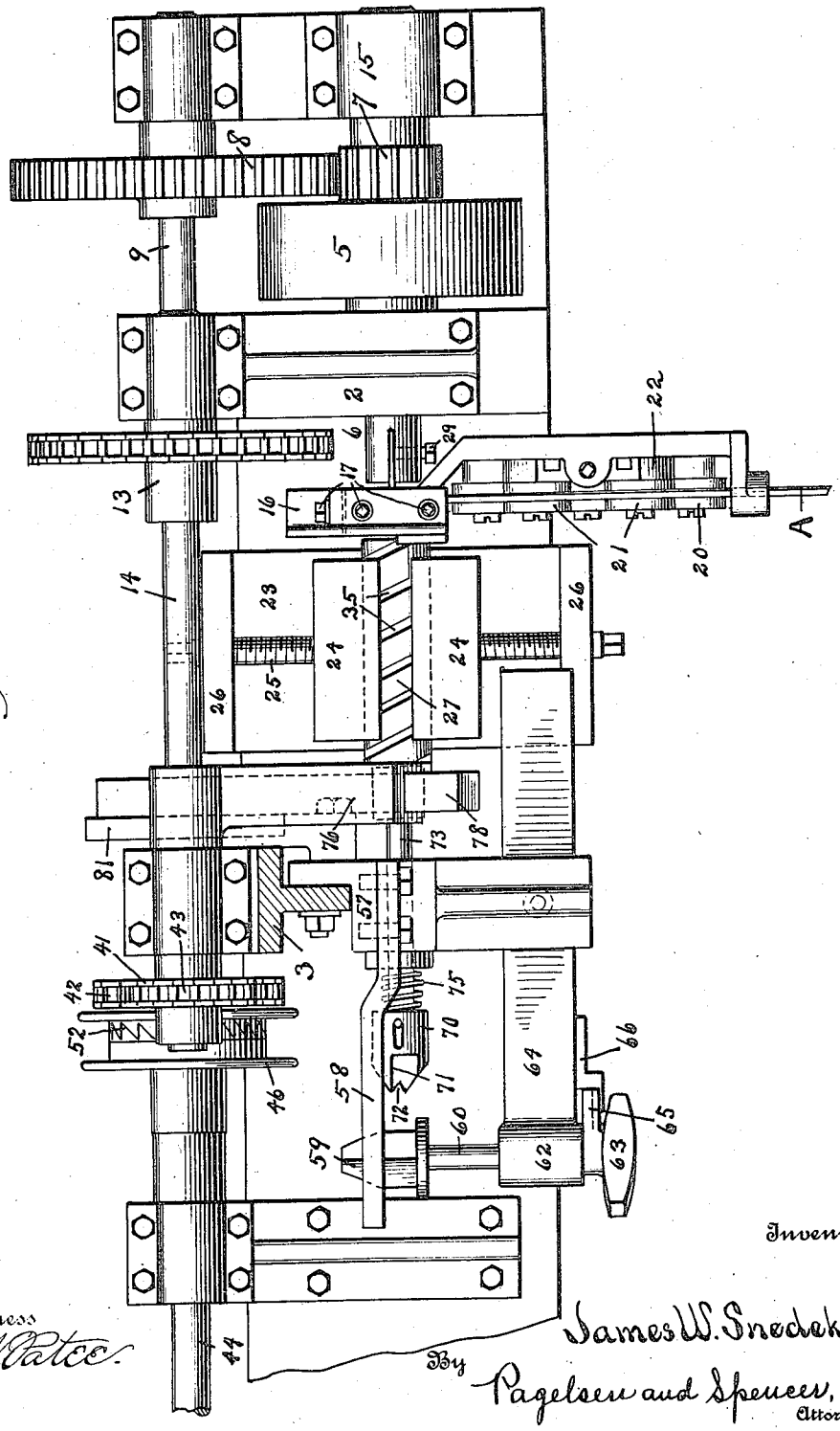


Fig. 3.

Witness
L. W. Patee.

Inventor
James W. Snedeker.
By Pagelsen and Spencer,
Attorneys.

J. W. SNEDEKER.

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Fig. 4.

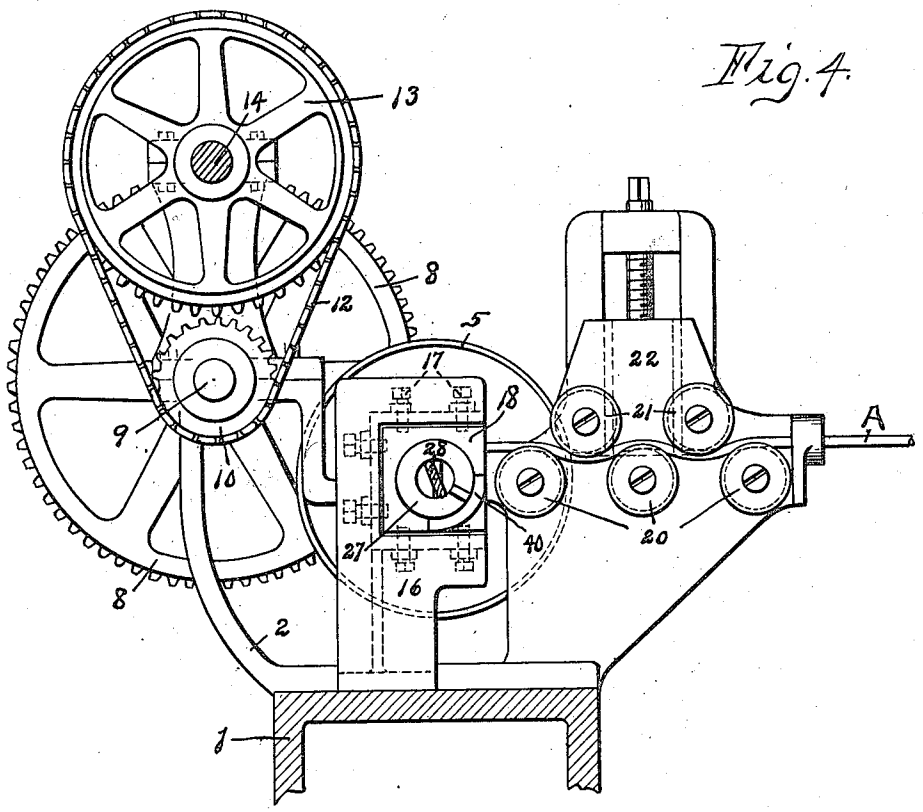
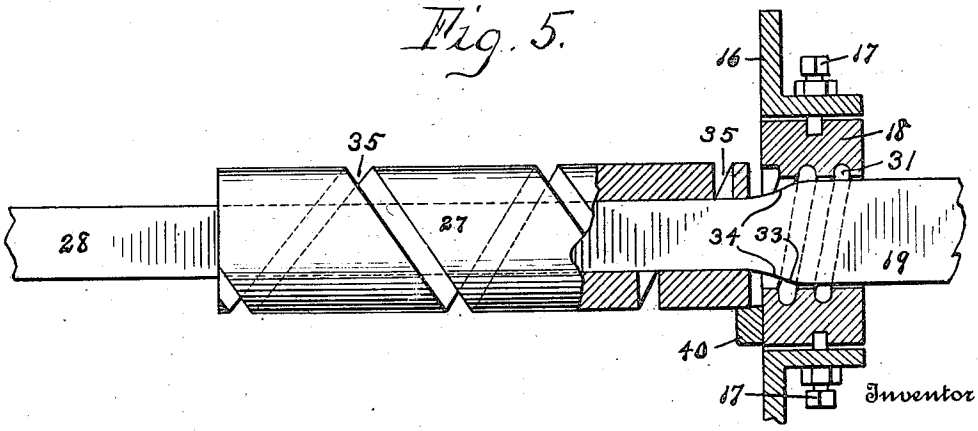


Fig. 5.



Witness

L. M. Patee.

Inventor

James W. Snedeker.

By Pagelsen and Spencer,

Attorneys.

J. W. SNEDEKER.

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6 SHEETS—SHEET 5.

Fig. 6.

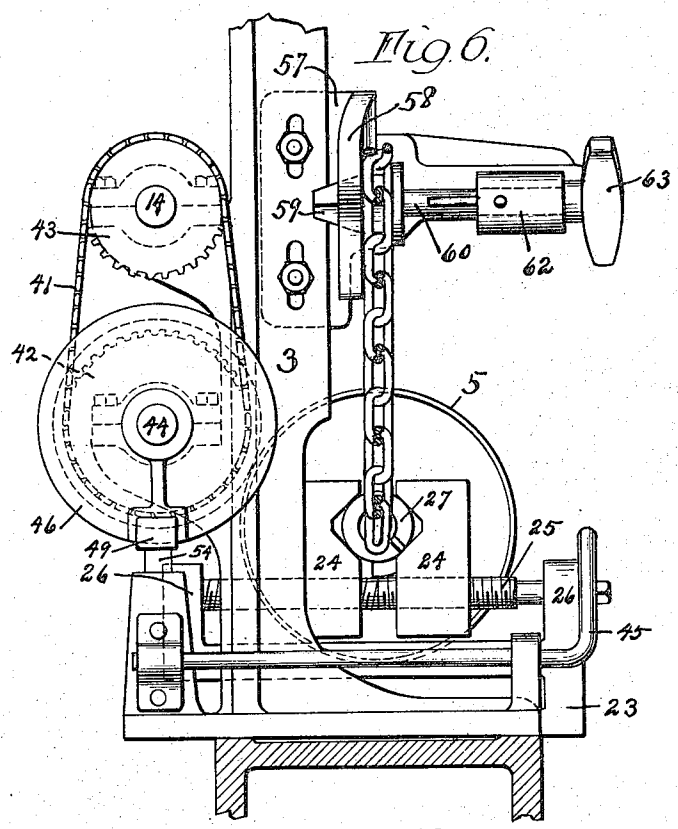


Fig. 8.

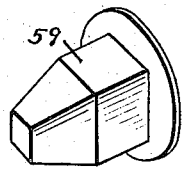


Fig. 9.

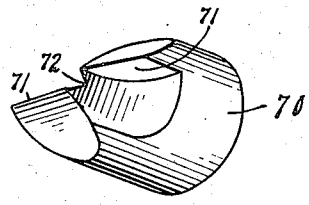


Fig. 7.

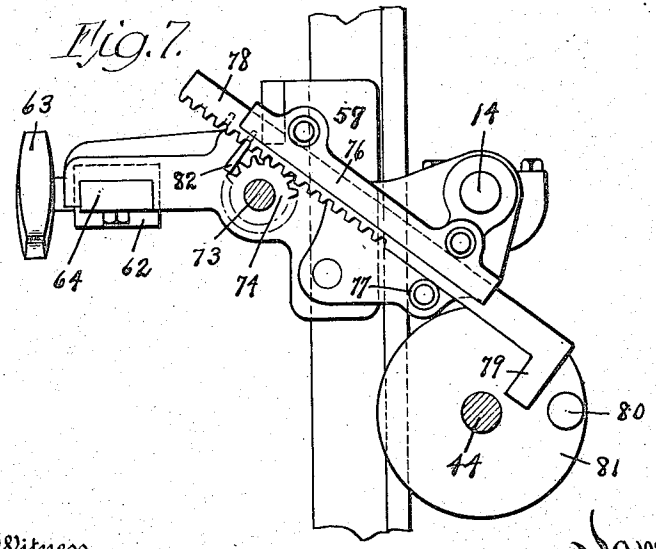
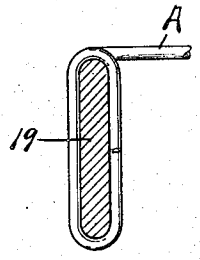


Fig. 10.



Witness

L. M. Patee

Inventor.

James W. Snedeker.

By Pagelsen and Spencer,

Attorneys

J. W. SNEDEKER.

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6 SHEETS—SHEET 6.

Fig. 11

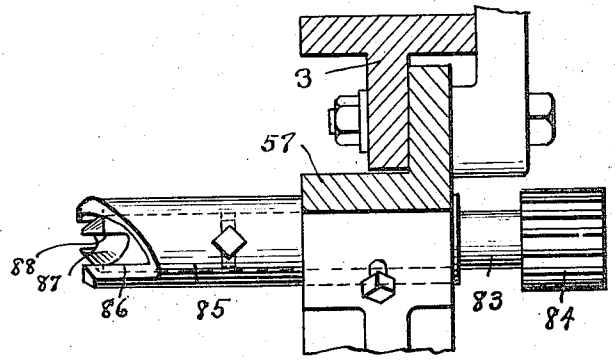


Fig. 12

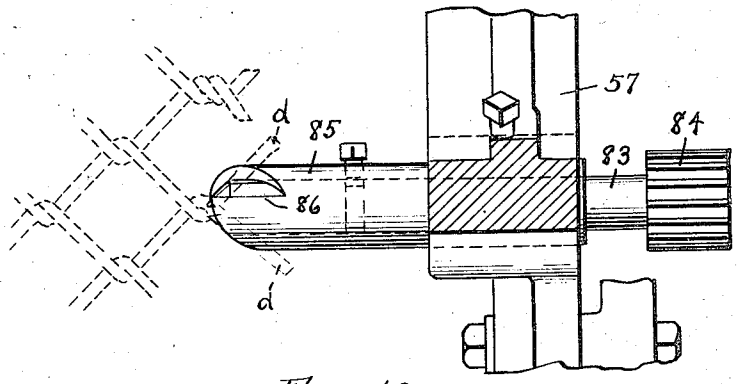


Fig. 13.

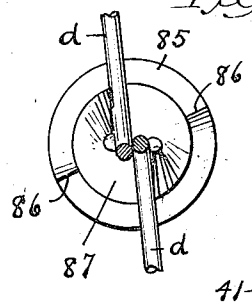


Fig. 14.

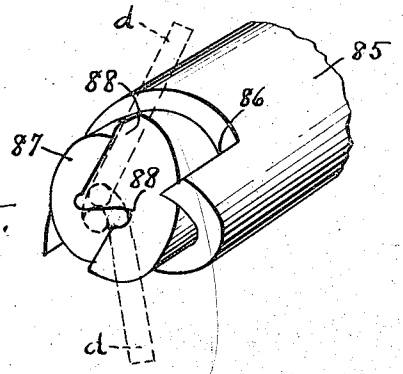
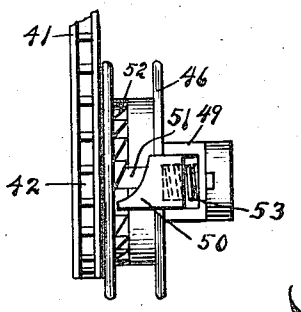


Fig. 15.



Witness

L. M. Patee

Inventor

James W. Snedeker.

By Pagelsen and Spencer.

Attorneys.

UNITED STATES PATENT OFFICE.

JAMES W. SNEDEKER, OF ADRIAN, MICHIGAN.

OPEN-MESH-FABRIC-MAKING MACHINE.

1,243,353. Specification of Letters Patent. Patented Oct. 16, 1917.

Application filed July 27, 1916. Serial No. 111,626.

To all whom it may concern:

Be it known that I, JAMES W. SNEDEKER, a citizen of the United States, and residing at Adrian, in the county of Lenawee and State of Michigan, have invented a new and Improved Open-Mesh-Fabric-Making Machine, of which the following is a specification.

This invention relates to machines for weaving open mesh fabrics from metal rods or wires and its object is to provide a machine that will produce a flat fabric by interlacing zigzag rods, which machine shall be simple in construction, effective in operation, and which will produce a fabric of even mesh throughout.

This invention consists in the combination of a support for the fabric, a flat revolving mandrel having larger and smaller portions, the larger portion revolving within a guide block provided with an entrance aperture for the metal rod which is to constitute the fabric, and within which block the rod is wound into a close flat helix, a stationary helical guide wherein the smaller portion of the mandrel revolves, the spaces between the windings of the helical guide receiving and separating the closely wound helix, the mandrel causing the now open helix to screw itself into the loops at the last finished edge of the completed fabric.

This invention further consists in means for twisting together the ends of each two adjacent helices and in means for preventing the adjacent mesh of the fabric from being distorted. It further consists in so twisting the mandrel that the completed helices will be flat.

In the accompanying drawings, Figure 1 is a front elevation, Fig. 2 a rear elevation, and Fig. 3 a plan of this machine. Fig. 4 is an elevation of the mandrel and straightening mechanism. Fig. 5 is a view, part in elevation and part in section, of the mandrel and mechanism coöperating therewith. Fig. 6 is an end elevation of the machine. Fig. 7 is an elevation of the driving mechanism for twisting together the ends of the rods. Fig. 8 is a perspective view of the plug which prevents distortion of the meshes when the ends of the rods are being twisted together. Fig. 9 is a perspective of the twister head. Fig. 10 is an end view of the first helix. Fig. 11 is a plan of a modified form of twisting mechanism. Fig. 12 is an elevation thereof. Fig. 13 is an end elevation of this modified form of twister and cutter. Fig. 14 is a perspective thereof. Fig. 15 is a detail of the clutch to drive the twisting mechanism.

Similar reference characters refer to like parts throughout the several views.

This machine is made up of a flat mandrel on which the fabric material is wound into close flat helices, of mechanism for revolving the mandrel, and of a guide for expanding the helices to produce a finished rod.

The material from which this fabric is constructed is preferably round wire A, usually less than one-fourth inch in diameter, which is first wound around a flat mandrel to constitute a close flat helix. The helix is then drawn out until the sides are at substantially right angles to each other. The extended helix B continues to revolve and advance and screws itself through the loops of the next previously positioned rod C of the fabric, as indicated in Fig. 1.

The machine is mounted on a foundation 1 and the moving parts are carried by the frames 2 and 3. The pulley 5 secured to the arbor 6 receives the usual driving belt. The pinion 7 on the arbor meshes with and drives the gear 8 on the shaft 9. A sprocket gear 10 on this shaft carries a chain 12 that runs on the sprocket wheel 13 on the shaft 14 that drives the twisting mechanism. The outer ends of the shaft 9 and arbor 6 may be journaled in the frame 15.

A pedestal 16 is provided with set-screws 17 to position and secure the block 18, which is internally threaded and in which the larger portion 19 of the mandrel revolves. Connected to this pedestal is a support for the usual straightening rollers 20 and 21, the latter mounted on the adjustable plate 22.

A pedestal 23 supports the jaws 24 that are adjustable by means of the screw 25 mounted in the lugs 26. These jaws grip the helical guide 27 within which the smaller or narrower portion 28 of the mandrel revolves. This mandrel is made of thin steel, preferably a little thicker than the rod A, and is mounted in a slot in the inner end of the arbor 6, being held in position by means of the screw 29.

As the mandrel revolves, the rod A is drawn into the block 18 through the hole shown in Fig. 1 and wound onto the mandrel, the rod following around in the helical groove 31 shown in Fig. 5 and closely engaging the mandrel to form a closely wound

flat helix whose end elevation is shown in Fig. 10.

Two wraps of the rod remain on the block; the third wrap in advance swings out with substantially the point 33 as a pivot. The inclined portions 34 of the mandrel permit this wrap to swing outward into the groove 35 between the wraps of the helical guide 27, which causes the rod helix to extend to substantially the form shown in Fig. 1. This zigzag rod has parts 36 lying in one plane and other parts 37 connected to the first and lying in a plane parallel to the first but separated therefrom somewhat more than the thickness of the metal. As the revolving rod B slides along the mandrel the front end describes a pure helix and screws itself through the loops of the last previously positioned rod C.

In order to facilitate the entrance of the front end of the rod A into the passage 35 between the wraps of the helical guide 27 and to insure a continued movement of this rod into said passage, a collar 40 may be secured to the block 18 and helical guide 27, as shown in Figs. 1, 4 and 5.

After the just completed rod B has connected itself to the fabric throughout the full width thereof, the machine is stopped and the rod cut off, after which the fabric is slid up over the support 39 a distance equal to one half the vertical width of a mesh and slid longitudinally of the mandrel a distance equal to one half the horizontal width of a mesh.

Fig. 1 shows how the adjacent ends of pairs of the rods may be twisted together. The shaft 14 extends across between the frames 2 and 3 and carries a sprocket wheel 43 on which is a chain 41 that passes around the sprocket wheel 42, loose on the shaft 44. A clutch of any one-revolution type, controlled by the lever 45, connects this sprocket wheel 42 to its shaft and causes the disk 46 on this shaft to make one revolution at each actuation of the lever.

This clutch is shown in Fig. 15, and consists of a disk or wheel 46 secured to the shaft 44. A boss 49 on this disk carries a slidable cam 50 and a dog 51 adapted to engage any one of the teeth 52 on the sprocket wheel 42 under pressure of the spring 53. A post 54 (Fig. 1) is movable up and down by means of the lever 45, but is normally in uppermost position with the roller 55 in the path of the cam 50, which causes the dog 51 to be pulled back out of engagement with the teeth 52 as soon as the cam engages this roller. When it is desired to actuate the twisting mechanism, the lever 45 is swung to lower the roller 55, which permits the spring 53 to force the dog 51 into engagement with one of the teeth 52, thus locking the shaft 44 to the sprocket wheel. The lever is immediately returned so that when the cam 50 reaches this roller 55, the parts will be again disengaged and the twister head stopped.

A bracket 57 is secured to the frame 3 and supports the arm 58 that extends back of the woven fabric and prevents it from being pushed back by means of the plug 59 on the rod or stem 60. This stem is slidable but non-revoluble in a sleeve 62 carried by a bar 64 adjustably mounted on this bracket and has a handle 63 at its front end so that it can be forced rearwardly into a mesh D (Fig. 1) and prevent this mesh being distorted when the ends of the rods forming this mesh are being twisted together. The handle is revoluble on the stem and has a beveled finger 65 (Fig. 3) that may be pushed down between the clamp 66 and the bar 64 to hold the plug 59 in its rear position during the twisting operation.

The twister head 70 shown in Fig. 9 is formed with two parallel planes 71 connected by a saddle 72. This head is revoluble with and slidable on a shaft 73, revolubly mounted in the bracket 57 and having a pinion 74 at its opposite end. The head is normally held toward the left (Figs. 1 and 3) by means of a spring 75. A guide 76 (Fig. 7) is secured to the bracket 57 and this guide, together with the roller 77, supports the rack-bar 78 which meshes with the pinion 74. A foot 79 on the rack-bar may be engaged by the roller 80 on the disk 81 secured to the shaft 44. The return movement of the rack-bar is caused by gravity and is limited by a pin 82 which may be positioned as desired.

After the rod B has been turned or screwed into engagement with the rod next above it, the machine was stopped, the rod cut off and the fabric moved up over the support 39 one half the height of a mesh and also moved to the right one half the length of a mesh. This brought a pair of ends *c* astraddle of the saddle 72 of the twister head 70, with one end in the space in front of each plane 71. The machine was again started and the production of the next rod begun, after which the plug 59 was inserted at D and the lever 45 shifted to connect the shaft 44 with the constantly running shaft 14.

The revolution of this shaft 44 caused the rack-bar to be lifted and the shaft 73 to be turned, and the head 70 twisted the two ends *c* as indicated in Fig. 1, the twister head moving back from the fabric against the spring 75 as the twist grew until when this was completed the parts were at the position shown in Fig. 1. At this time, the pin 80, moving up and forward (Fig. 7), passed from under the foot 79 and the rack-bar, shaft 73 and twister head returned to their normal position. As the return movement of the rack-bar is limited by the pin 82, the forward movement is also thus limited.

When the introduction of the rod B is completed, the fabric is moved one half mesh to the right and one half mesh up, positioning it for the next rod.

When it is desired to leave the ends of the rods in the form of sharp spikes, the mechanism shown in Figs. 11 to 14 may be employed instead of the twister structure shown in Figs. 1, 2, 3, 7 and 9. The bracket 57 which carries the twister shaft 83 is of the same construction as before. The pinion 84 is revolved back and forth by the same means as the pinion 74. Rigidly mounted on this bracket, concentric with the shaft 83, is a sleeve 85 formed with shear members 86. Within this sleeve and connected to the shaft 83 is the revoluble twister head 87 having diagonal grooves 88 to receive the ends *d* of the rods constituting the fabric. The walls of these grooves constitute shear members.

The fabric is moved toward the right and the ends *d* straddle the twister head 87, extending diagonally of the sleeve 85. When the twister head is revolved, the ends *d* will be twisted together, but at the beginning of the twisting will be sheared diagonally by the walls of the grooves 88 and the shear members 86 to form sharp points, as indicated in Fig. 12. These points extend beyond the twisted portions and are all of the same height.

Many changes can be made in the details of construction of this machine without departing from the spirit of my invention as set forth in the claims.

I claim:—

1. The combination of a support for a fabric consisting of a series of parallel flat helices whose loops engage adjacent helices throughout their length, a flat mandrel having wider and narrower portions, each having parallel edges, the edges of the two portions connecting by means of inclines and the width of the narrower portion equaling the greater interior diameter of the helices, means to revolve the mandrel to wind a metal rod onto the wider portion of the mandrel to form a close flat helix, and means to lengthen the helix on the narrower portion of the mandrel while revolving and reduce its diameter.

2. The combination of a support for a fabric consisting of a series of parallel flat helices whose loops engage adjacent helices throughout their length and constitute meshes in the form of parallelograms, with a block movable into the meshes along one edge of the fabric, and means to twist together the ends of the helices which form the mesh occupied by the block.

3. The combination of a support for a square-mesh fabric consisting of a series of generally parallel rods bent to zigzag form which interlock throughout their length, with a tapered block movable into the meshes along one edge of the fabric, and means to twist together the ends of the rods which form the mesh occupied by the block.

4. The combination of a revoluble flat mandrel having wider and narrower portions, two cylindrically bored internally threaded members of different diameters surrounding the mandrel, the pitch of the threads in said members being such that the circumferential length of the threads in both members is the same, and means to revolve the mandrel.

5. The combination of a support for a fabric consisting of a series of parallel flat helices whose loops engage adjacent helices throughout their length, a flat mandrel having wider and narrower portions, each having parallel edges, the edges of the two portions connecting by means of inclines and the width of the narrower portion equaling the greater interior diameter of the helices, means to revolve the mandrel to wind a metal rod onto the wider portion of the mandrel to form a close flat helix, means to lengthen the helix on the narrower portion of the mandrel while revolving and reduce its diameter, means to twist together the adjacent ends of two adjacent helices, and shears to cut these ends to form sharp spikes.

6. The combination with a support for a fabric consisting of a series of parallel flat helices whose loops engage adjacent helices throughout their length and constitute meshes in the form of parallelograms, of a block movable into the meshes along one edge of the fabric, means to twist together the ends of the helices which form the meshes occupied by the block comprising a revoluble twister head having grooves to receive the ends of said helices, and a sleeve surrounding the twister head and formed with shear members to cut the ends of said helices diagonally.

7. The combination with a support for a square-mesh fabric consisting of a series of generally parallel rods bent to zigzag form which interlock throughout their length, of a tapered block movable into the meshes along one edge of the fabric, means to twist together the ends of the rods which form the mesh occupied by the block and means to cut the ends of said rods diagonally of their length to constitute sharp spikes.

8. The combination of a helical guide for forming wire coils having a fine constant pitch, a second helical guide having a coarse constant pitch, a flat mandrel extending through the guides having a wider portion with parallel edges within the first-named guide than in the second, means to revolve the mandrel, and means to feed metal rods thereto.

9. The combination of a guide having an interior helical groove of fine pitch, a second guide having a similar groove of coarse

pitch, the length of the convolutions of the grooves of the two guides being substantially the same, a flat mandrel extending through said guides and having wide and narrow portions whose edges are parallel and whose widths are substantially the same as the internal diameters of the guides, means to revolve the mandrel, and means to feed metal rods thereto.

10. The combination of a guide having an interior helical groove of fine constant pitch, a second guide having a similar groove of coarse constant pitch, the length of the convolutions of the grooves of the two guides being substantially the same, a mandrel extending through said guides and having portions fitting said guides, and means to revolve the mandrel.

JAMES W. SNEDEKER.