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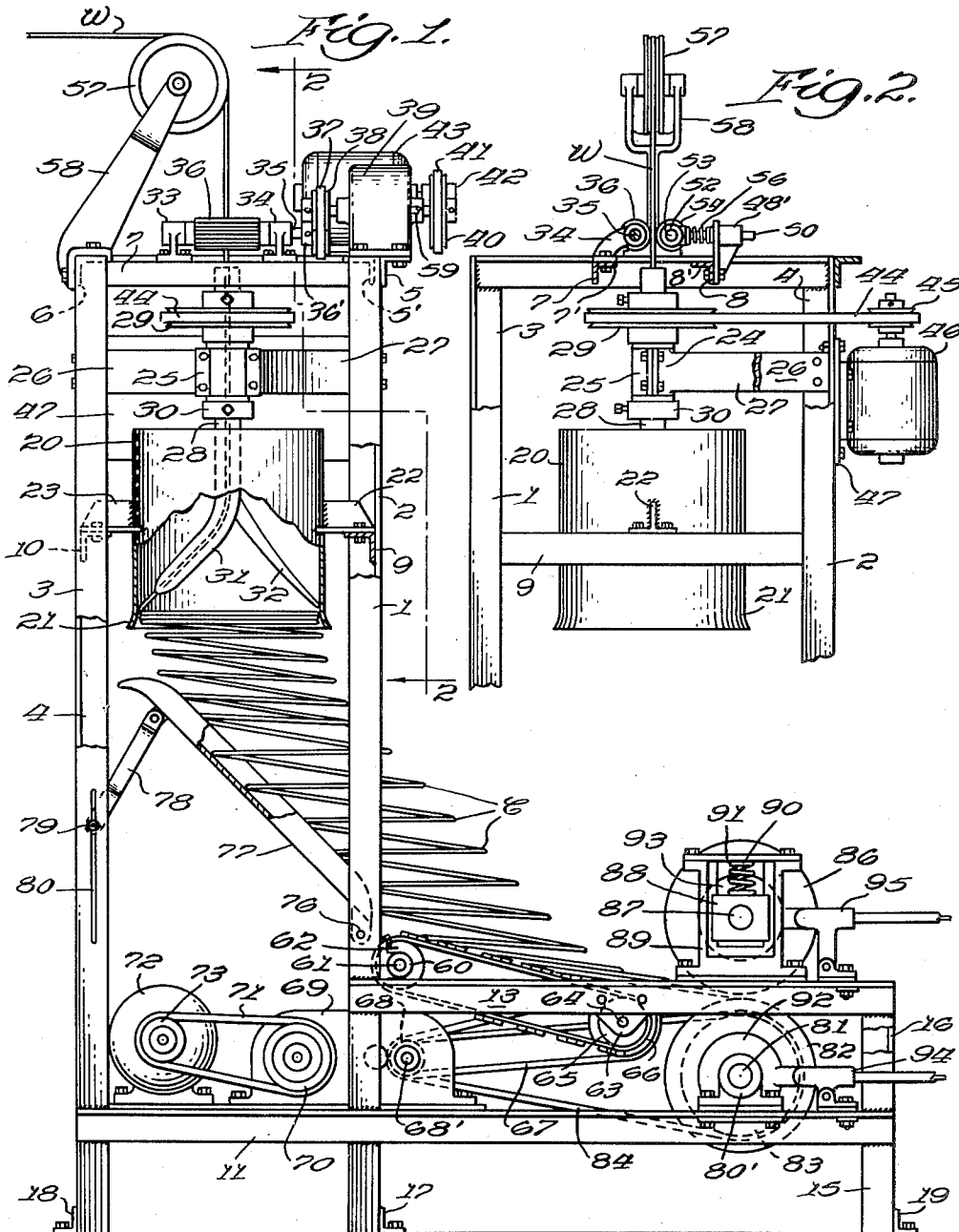
R. F. STOCKTON

2,684,087

MACHINE FOR MAKING WIRE FABRIC

Filed March 31, 1951

2 Sheets-Sheet 1



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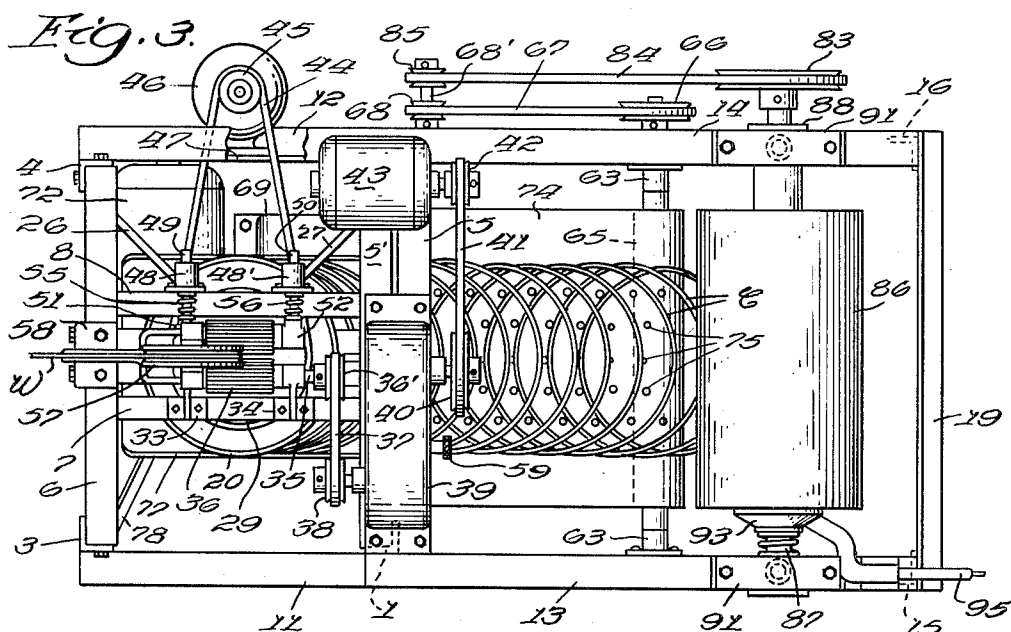
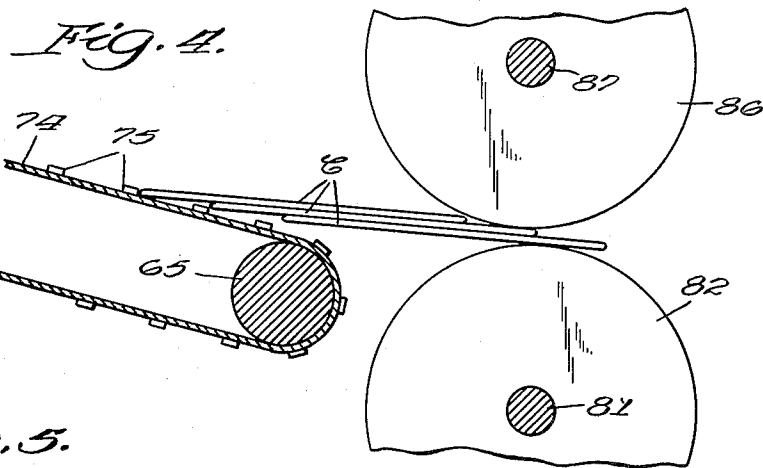
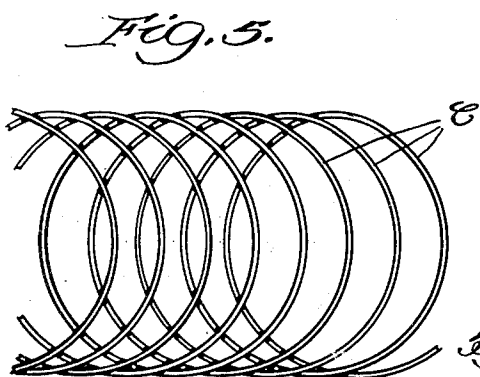
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UNITED STATES PATENT OFFICE

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MACHINE FOR MAKING WIRE FABRIC

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7 Claims. (Cl. 140—112)

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This invention relates to wire working machinery and particularly to an improved machine for forming wire mesh fabric.

An object of the invention is to provide a machine adapted to form a single strand of wire into a wire mesh fabric and which may be adjusted to vary the mesh characteristics of the fabric.

Another object of the invention is to provide a machine for forming a fabric from a single strand of wire comprising means for continuously forming a helix and means for simultaneously laterally and uniformly displacing the coils of the helix at the end opposite the helix forming means and welding the laterally displaced coils with resultant production of a wire mesh fabric.

With the foregoing objects in view, together with such other objects and advantages as may subsequently appear, the invention resides in the parts, and in the construction, combination and arrangement of parts as well as in such modifications thereof as may be suggested to others skilled in the art by the following specification of a practical mode of execution of the invention, reference being had to the accompanying drawings which form a part of said specification and in which drawings:

Fig. 1 is a side elevation of a machine adapted to execute the method of the invention and to produce the single strand wire mesh fabric which constitutes one part of the invention; certain portions being broken away for clearness of illustration.

Fig. 2 is a fragmentary sectional view taken on the line 2—2 of Fig. 1 with certain parts broken away.

Fig. 3 is a top plan view of the machine shown in Fig. 1.

Fig. 4 is an enlarged, fragmentary, end elevation (somewhat diagrammatic) of the welding means and the feed means associated therewith, and

Fig. 5 is a side elevation of a section of a representative single strand wire mesh fabric produced by the machine disclosed in the preceding figures.

Referring first to Figs. 1 to 4, the machine comprises a frame structure including four upright members 1, 2, 3 and 4 arranged in plan in rectangular formation. At their upper ends the members 1 and 2 are connected by a pair of cross members 5 and 5', while the members 3 and 4 are similarly interconnected by a cross member 6. Adjacent their midpoints, the cross members 5' and 6 are interconnected by spaced cross bars 7 and 8. The members 1 and 2 at a point slightly below the upper ends thereof are interconnected by a cross member 9 while the members 3 and 4 are similarly interconnected by a cross member 10. Adjacent their lower ends, the members 1 and 3 have attached thereto one end of a later-

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ally extending member 11, the other end of which projects beyond the outer vertical face of the frame defined by the members 1 and 2 and a similar member 12 is similarly connected to the members 2 and 4. The members 1 and 2 each also have connected thereto slightly above the members 11 and 12 a second pair of laterally extending members 13 and 14, respectively, which extend parallel to the members 11 and 12 and at their free ends the members 11 and 13 are connected to a post 15 while the free ends of the members 12 and 14 are similarly connected to a post 16. Additionally, the members 1 and 2, 3 and 4, and posts 15 and 16 are interconnected at their lower ends by cross members 17, 18 and 19 respectively. The above described portion of the frame structure can be readily formed from angle iron elements assembled as above and preferably welded at the joints. Other equivalent frame construction may be obtained by the use of castings or by a wooden frame, but the above mode of construction will be found to be economical to build and to have ample strength with a minimum weight.

Mounted near the upper end of the frame portion defined by the members 1, 2, 3 and 4 is a vertically disposed hollow cylinder 20 with a slightly flared lower end 21. Attached to the outer surface of the cylinder at diametrically opposite points are a pair of bracket members 22 and 23 which are bolted to top surfaces respectively, of the cross members 9 and 10 (see Fig. 1) and which locate the axis of the cylinder substantially coincident with the vertical center line of the portion of the frame structure in which the cylinder is located (see Fig. 3).

Mounted in a plane slightly above the upper end of the cylinder 20 and disposed coaxially with respect thereto is a bearing 24 having a removable cap 25. The bearing includes outwardly diverging legs 26 and 27 which are bolted to the inner faces of the members 2 and 4. A hollow shaft 28 is mounted in the bearing 24 and is held against endwise movement therein by the opposed faces of a belt pulley 29 mounted on the shaft above the bearing and a thrust collar 30 mounted on the shaft below the bearing 24. The shaft 28 below the thrust collar extends into the cylinder 20 and below the upper end of the cylinder the shaft is bent about a relatively wide radius to form an outwardly and downwardly extending arm portion 31 which terminates above the flared portion 21 of the cylinder and a slight distance inwardly of the inner wall of the cylinder (see Fig. 1). Also the shaft 28 in the region of the bend therein has fixed thereto an outwardly and oppositely divergent finger 32, the distal end of which is located in close proximity to the inner wall of the cylinder 20 in a plane slightly below the plane of the end of the shaft 28.

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The cross bars 7 and 8 of the frame structure are formed of angle irons disposed with the horizontal flange portions 7' and 8' thereof extending toward each other in the same horizontal plane and with the vertical flange portions thereof depending below said plane. The upper end of the hollow shaft 28 extends above the hub of the pulley 29 and terminates slightly below the under faces of the flanges 7' and 8' (see Fig. 2). Mounted on the cross member flange 7' is a pair of spaced, aligned, bearing brackets 33 and 34 in which a shaft 35 is mounted for rotation. Fixed to the shaft 35 and extending between the adjacent faces of the bearing brackets is a toothed roller 36; the engagement between the ends of the roller and the bearing brackets serving to hold the shaft against endwise movement. The shaft 35 extends a short distance beyond the outer face of the bearing bracket 34 and at its end carries a pulley 36' connected by a belt 37 to the driven pulley 38 of an infinitely variable speed transforming unit 39; the driven pulley 40 of which is connected by a belt 41 to the pulley 42 of a driving motor 43. As best shown in Fig. 3, the motor 43 and the speed transformer may conveniently be mounted on the horizontal flange portions of the cross members 5 and 5'. The pulley 29 on the hollow shaft 28 is likewise connected by a belt 44 to the driving pulley 45 on a second motor 46 mounted on a plate 47 fixed to the upright members 2 and 4 of the frame structure (see Fig. 3).

Mounted on the cross member 8 directly opposite the bearings 33 and 34 are a pair of brackets 48 and 49 each having a bore therein adapted to slidably receive the shanks 49 and 50 of a pair of bearings 51 and 52 in which a shaft 53 carrying a pinch roller 54 is mounted. Springs 55 and 56 are mounted on the bearing shanks 49 and 50 constantly urge the roller 54 against the roller 36. The rollers are so positioned that they meet substantially in a vertical plane containing the axis of rotation of the shaft 28 (see Figs. 2 and 3). The rollers 36 and 54 draw a wire W from a source of supply (not shown) over an idler pulley 57 carried by a bracket arm 58 mounted on the frame structure and feed it into the hollow shaft 28. As the shaft 28 is rotated the bent portion 31 thereof will cause the wire fed into it by the rollers 36 and 54 to be laid in a coil within the cylinder as shown in Fig. 1 and if there should be any tendency for the coil to stick within the cylinder, the follower arm 32 will force the coils toward the flared lower end of the cylinder. Since it is necessary that the rate of wire feed be closely related to the linear rate of coil formation within the cylinder, the drive for the roller 36 is made variable by the interposition of the unit 39 on which a hand knob 59 may be operated to vary the speed of the roller 36. The speed transformer may be installed on the drive for the shaft 28, if desired, or it may be accomplished by variable speed motors; the only essential being that at least one of these two drives be infinitely variable to obtain correlative rates of wire feed and of coil formation for each type of wire or other condition that may be met. Alternatively, a single motor may be used for both drives with appropriate driving connections, but the provision of separate motors as here shown is believed to make the simpler and more readily maintained construction.

Fixed to the outer faces of the frame members 1 and 2 adjacent the juncture of the frame members 13 and 14 therewith is a pair of bearings 60 in which a shaft 61 carrying an idler pulley 62 is

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mounted and fixed to the inner faces of the members 13 and 14 at about their midlength, and disposed below the lower edge of said members is a second pair of bearings 63 arranged in parallelism with the bearings 60. A shaft 64 is journaled in the bearings having fixed thereto and extending between the bearings a second pulley 65 which is of the same width as the pulley 62. The shaft extends beyond the outer face of the bearing 63 carried by the member 14 and has fixed thereto a pulley 66 connected by a belt 67 to the driven pulley 68 carried by the driver shaft 68' of a variable speed transformer 69 of the same general type as the transformer 39 and which has a driving pulley 70 connected by a belt 71 to a motor 72 having a pulley 73. Trained about the pulleys 62 and 65 is a conveyor belt 74 having the outer surface provided with a series of stud-like projections 75; the projections being arranged in spaced curved rows having a curvature about the same as the curvature of the coils formed by the shaft 28 within the cylinder 20 as previously described. Extending between the frame members 1 and 2 slightly above the bearings 60 is a rod 76 on which the lower end of an adjustable chute element 77 is mounted. As shown in Fig. 1, this chute element extends upwardly and rearwardly from its lower end and terminates beneath and slightly spaced from the lower end of the cylinder 20; the upper end of the chute being supported for vertical adjustment by a bracket arm 78 having one end pivotally connected to the bottom of the chute and the other end laterally offset and connected by a bolt 79 for vertical adjustment along a slot 80 in the member 4.

Mounted on the upper faces of the frame members 11 and 12 adjacent their connection with the post elements 15 and 16 is a pair of bearings 80' in which a shaft 81 is journaled. Fixed to the shaft 81 and extending over the major portion of the width of the space between the bearings 80' is a first welding roller 82. The shaft 81 extends beyond the outer end of the bearing 80 carried by the member 12 and carries a pulley 83 connected by a belt 84 to a second pulley 85 carried by the speed transformer driven shaft 68'; the pulleys being of such size that the conveyor and welding roller are driven at the same linear speed. Cooperating with the driven welding roller 82 is an idler welding roller 86 carried by a shaft 87 journaled in bearing blocks 88 slidably mounted in guide blocks 89 fixed to the upper faces of the frame members 13 and 14 and including compression springs 90 reacting between cap members 91 and the bearing blocks 88 to urge the roller 86 toward the roller 82. The welding rollers at one end thereof are provided, respectively, with spring biased brush contacts 92 and 93 affording electrical connection through leads 94 and 95 with a suitable source of welding current.

The operation of the last described portion of the machine is believed to be clear. As the coiled wire drops out of the cylinder 20, it slightly extends by reason of its weight and contacts the chute element 77 which urges the coils C laterally as they move downwardly and the coils are thus deposited on the upper face of the conveyor belt 74 as it comes up over the idler pulley 62 and the projections 75 on the belt engage the rear portions of the successive coils and space them for entry between the welding rollers 82 and 86 (see Figs. 3 and 4). As the coils pass between the rollers, the wires are electrically welded together

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at each intersection with resultant production of a wire mesh fabric such as illustrated in Fig. 5. If the speed of the conveyor and welding rollers is slightly increased relative to the rate of coil production by adjustment of the speed transformer 69 and a conveyor belt having correspondingly wider spaced projections is employed, the pattern will be somewhat different, and if a slower rate and corresponding conveyor belt is employed a finer mesh fabric will be produced.

Thus, there has been achieved a machine adapted to produce a continuous wire mesh fabric from a single wire and there has also been provided a new type of wire mesh fabric and a novel method by which the fabric may be produced. While a machine such as disclosed above is the most efficient mode of practice of the novel method, the method can also be practiced by forming the initial helix on a mandrel, then stripping the formed helix from the mandrel and then feeding the flattened and laterally offset coils through a pair of welding rollers or fixing the coils in a suitable holding fixture and separately welding the wires together at each intersection. The above described steps are believed to be such that those skilled in the art will be able to follow these suggested alternative modes of practice of the novel method without the necessity of further illustration.

The resulting fabric is both neat in appearance and strong. It is particularly to be noticed that at its edges the wire lies substantially parallel to the length of the fabric and that the closeness of the overlapping portions of the wire gives a tension resisting factor at each edge that is practically double the tensile strength of the wire composing the fabric. Preferably the fabric is formed from dead soft wire and the fabric may then be heat treated if desired to give it other characteristics or coatings or rustproofing may be applied as is best suited to the uses for which the fabric is intended.

While I have illustrated and described certain modes of execution of my invention, I do not thereby imply that the invention is to be considered limited to the foregoing disclosure, but the invention is contemplated to include all such modifications of the machine, its parts and their construction and arrangement as shall come within the purview of the appended claims.

I claim:

1. In a machine for forming a mesh fabric from a single length of wire, the combination of, means for continuously feeding a wire into the machine, driving means for said wire feeding means, helix forming means comprising a rotating guide and a stationary cylinder open at both ends and having an inner wall disposed in adjacency to the path of said rotating guide; said guide receiving wire from said feeding means and directing it against said cylinder wall with resultant formation of the helix, and means for rotating said guide; means for effecting adjustment of the relative speeds of said wire feeding means and said rotating guide to bring them into synchronism with respect to the passage of wire therethrough, means continuously operative to discharge the helix coils from said cylinder, a continuously unidirectionally operating conveyor spaced from the discharge end of said cylinder, guide means interposed between said cylinder and said conveyor operative to direct coils from said cylinder to said

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conveyor, means operating in conjunction with said conveyor effective to arrange the coils on said conveyor in uniformly spaced, overlapping relation, roller welding means continuously receiving the overlapping coils from said conveyor, welding them to each other at all points of intersection, and discharging the finished fabric from the machine, a driving means for operating said conveyor and said roller welding means at identical linear rates of travel, and a speed adjusting means in said last-named driving means operable to adjust the speeds of travel of said conveyor and roller welding means to conform to the rate at which the helix coils are formed and delivered and the spacing of the delivered coils effected by said coil spacing means.

2. A machine as claimed in claim 1 in which the wire feeding means comprises a pair of pinch rollers, a driving motor for said rollers, and a variable speed transformer interposed between said motor and said pinch rollers.

3. A machine as claimed in claim 1 in which the coil forming cylinder is disposed with a vertical axis and in which the coil forming guide is mounted for rotation in a bearing coaxially disposed with respect to the axis of said cylinder and located at the upper end of said cylinder.

4. A machine as claimed in claim 3 in which the wire feeding means comprises a pair of horizontal axis pinch rollers disposed above the stationary cylinder with the meeting faces of said rollers disposed in a vertical plane containing the axis of the cylinder and in which said rollers are operatively connected to a motor through an interposed manually variable speed transforming means operable to vary the rate of wire feed to conform to the rate required by the rotating guide means in the formation of coils.

5. A machine as claimed in claim 1 in which the coil discharging means comprises an arm rotating with the coil forming guide and disposed substantially diametrically opposite thereto and having a distal end disposed below the plane of said rotating guide and in close adjacency to the inner wall of the coil forming cylinder.

6. A machine as claimed in claim 1 in which the coil spacing means comprises spaced lugs on the coil engaging face of the conveyor.

7. A machine as claimed in claim 1 in which the conveyor comprises an endless belt trained about spaced horizontal pulleys and is disposed below and at one side of the stationary cylinder and in which the guide means between the cylinder and conveyor comprises a chute extending diagonally downward from the lower end of the cylinder to the coil receiving end of the conveyor.

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