Oct. 12, 1948. C. C. WICKWIRE 2,451,423

ART OF WELDING WIRE-MESH FABRICS

Filed Sept. 25, 1945

2 Sheets-Sheet 1

Fig. 2

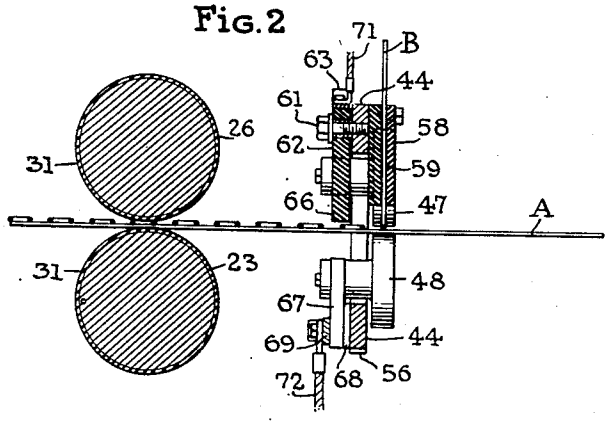


Fig. 1

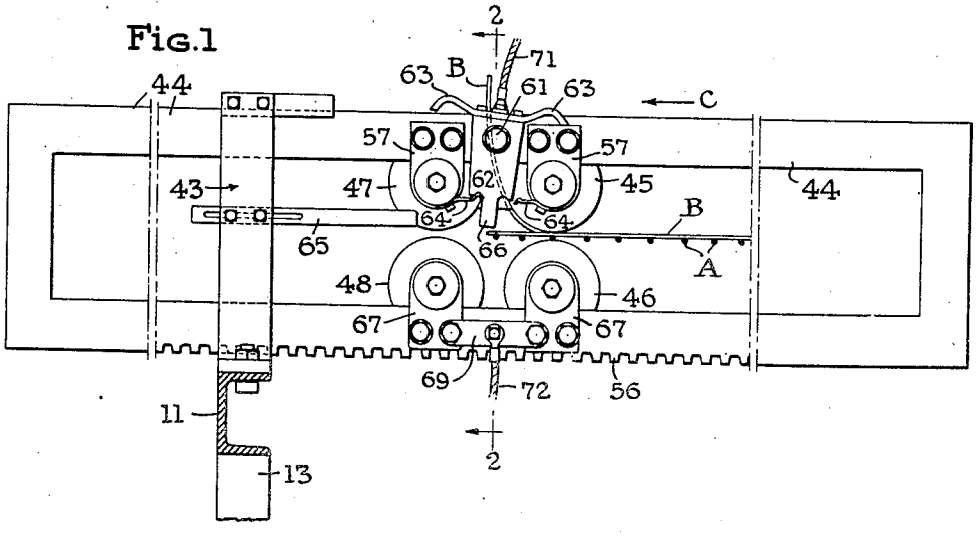
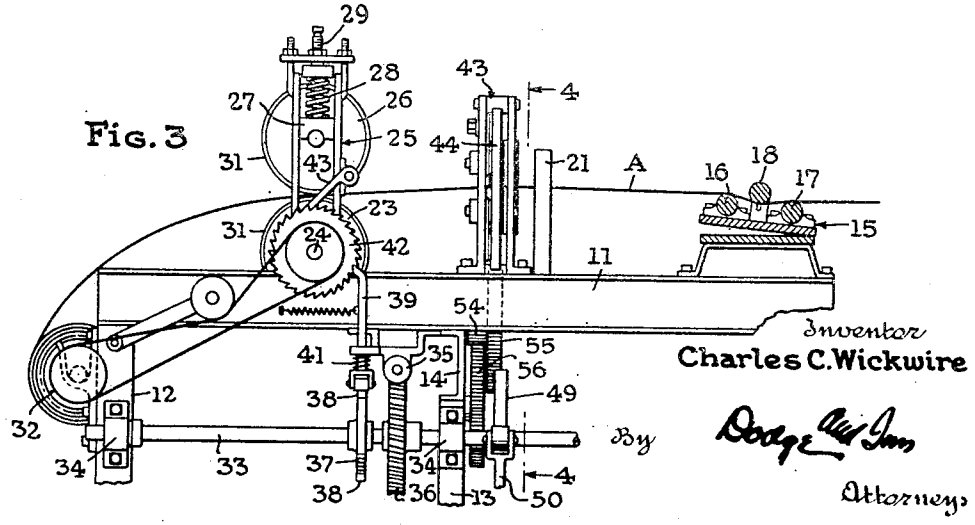


Fig. 3



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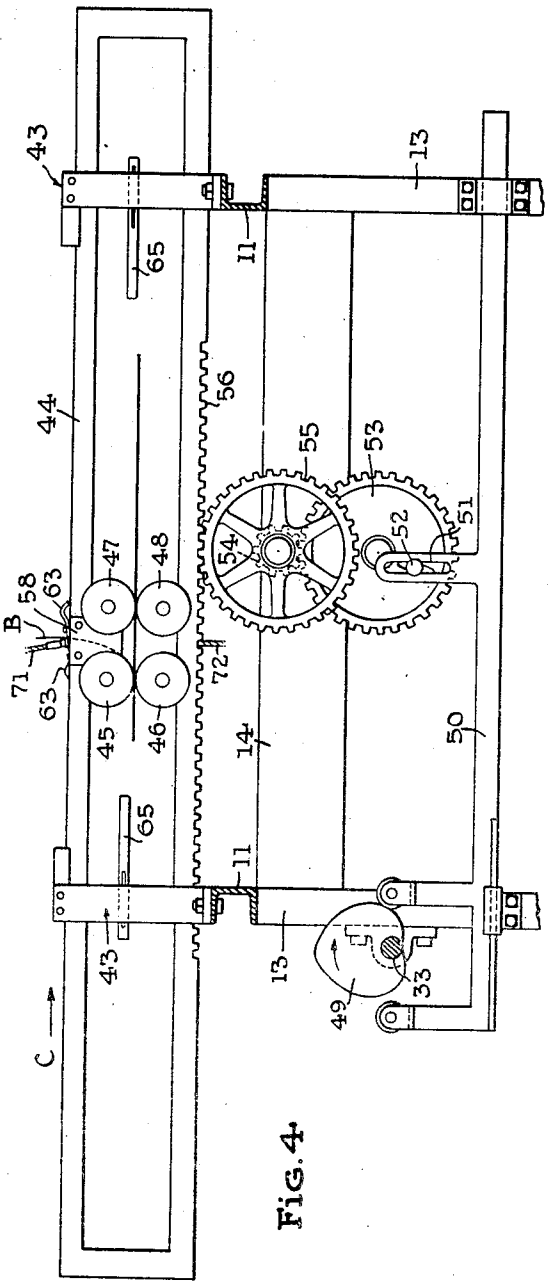


Fig. 4.

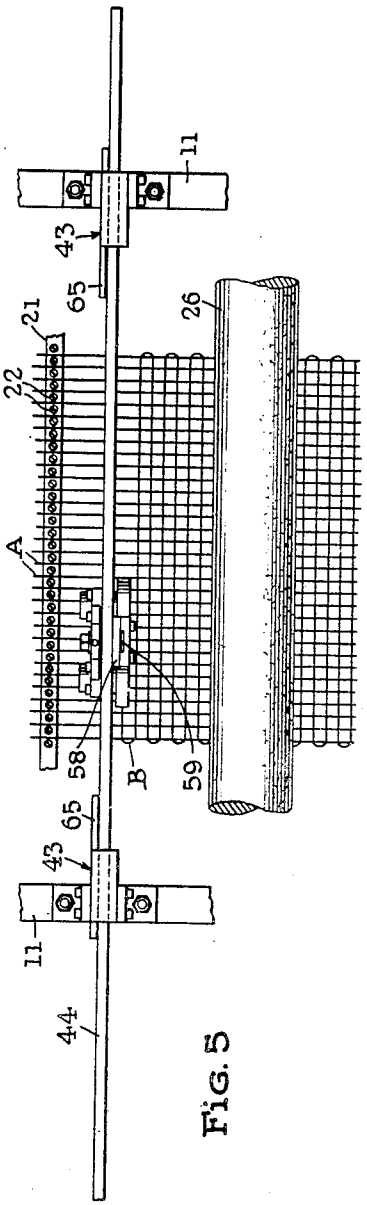


Fig. 5

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ART OF WELDING WIRE-MESH FABRICS

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6 Claims. (Cl. 140—112)

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This invention relates to the art of manufacturing mesh fabrics in which the crossing strands are welded, and relates to means for laying and simultaneously welding parallel strands back and forth upon another layer of strands. For lack of better terms, and adopting a loose analogy to the weaving art, the strand laid back and forth will be called the weft and the other layer of strands upon which it is laid will be called the warp. The two are not interwoven. Fabrics of this type are known.

The weft strands may be laid at various angles to the warp strands, but the simplest and most useful fabric is square mesh, which is here chosen for illustration. In this connection, it should be understood that the novel features of the present invention have to do with the way in which the weft strands are laid and welded. This concept can be used with warps formed in various specifically different ways. The one chosen for illustration is the simplest and most usual, in which the warp strands are parallel, and uniformly spaced and run in the direction of the length of the fabric.

As a conventional warp-forming means the following arrangement is shown in the drawings: the warp strands are drawn from a spool stand (not illustrated) through tension rollers and a fixed reed by a pair of gripping feed-rolls which are intermittently fed one weft interval. The weft-laying and welding unit operates between the reed and the feed rolls. Thus the feed rolls operate on welded cloth, and this cloth passes from the feed rolls to a cloth beam. An organization of this type is shown and will be described as one way of forming a warp to which the weft strand may be applied and welded according to the invention.

In the drawings:

Figure 1 is a view of the weft-laying and welding carriage looking from the cloth end of the machine.

Figure 2 is a section on the line 2—2 of Figure 1.

Figure 3 is a side elevation of the machine omitting all but the essential components.

Figure 4 is a section through the machine on the line 4—4 of Figure 3, drawn on an enlarged scale, showing the drive for the welding carriage.

Figure 5 is a fragmentary plan view showing parts shown in Figure 2, and the take-up roll.

Refer first to Figure 3. The main frame members are two side sills 11 rigidly supported and cross-connected in any suitable way. Supports 12 and 13 appear in Figure 3 as does a cross-connecting member 14.

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The warp strands A are drawn from a conventional spool stand (not shown) through a tension device generally indicated at 15 and comprising rolls 16 and 17 rotatable in fixed bearings, and a roll 18 mounted intermediate the rolls 16 and 17 and adjustable to vary the deflection of the wire strands. Thence the warp passes through a fixed reed whose frame appears at 21. The frame carries a series of vertical spaced rods 22 (Fig. 5) between which the warp strands A pass, so as to be uniformly spaced.

Beyond reed 21 the weft-laying mechanism acts. This will be described later. The warp (with weft welded thereto) passes between and is fed forward by the feed rolls. The lower roll 23 is carried by shaft 24 which turns in fixed bearings (not shown) at the base of guide frame 25. The upper roll 26 turns in bearing 27 vertically slidable in guide frame 25 and urged downward by coil compression springs 28. Stress in springs 28 is adjustable by turning screws 29. The rolls 23 and 26 have yielding surfaces 31 (Fig. 2), so that they will grip the wire fabric. A heavy canvas facing has been used successfully for this purpose.

From rolls 23, 26 the cloth passes to an impositively driven cloth beam 32 on which the finished wire-mesh cloth is wound.

The timing or lay shaft of the machine appears at 33 and is supported in bearings, some of which appear at 34. The shaft 33 is driven at uniform speed by a motor (not shown) through a speed reducing train comprising a worm 35 and worm-wheel 36. A generally circular cam 37 on shaft 33 has two lobes 38 spaced 180° and arranged to actuate the take-up rolls a definite amount at each reversal of the weft-laying carriage. The lobes force up pawl plunger 39 (which has a follower roller engaging cam 37). The pawl plunger is urged downward by a spring 41 and coacts with a ratchet wheel 42, on shaft 24, to feed it one tooth interval. A pawl 43 prevents retrograde movement of wheel 42.

The mechanism so far described is simply a conventional warp forming and feeding mechanism for which no novelty is here claimed. It is described as one typical environment in which the invention may be used.

Guide frames 43 mounted on sills 11 between reed 21 and roll frame 25, guide an elongated rectangular frame 44 which is the welding carriage. The frame 44 encircles the warp and lies in a plane transverse to the warp. The internal length is somewhat more than twice the width of the warp so that reciprocation of the frame in

the direction of its length will carry the welding rolls 45, 46, 47, 48 (mounted at midlength of the carriage) back and forth across the entire width of the warp and slightly beyond each edge of the warp.

The welding carriage is reciprocated by mechanism shown in Figure 4. A cam 49 is fixed on shaft 33 in such angular position that it moves its follower 50 to its right-hand or left-hand limit of motion as one or the other of the lobes 38 on cam 37 engages and actuates pawl 39. Follower 50 has a slot 51 in which the crank pin 52 on gear 53 is confined. The eccentricity of crank pin 52 is adjustable. When set for its shortest radius, follower 50 will turn gear 53 only about 120°, so that the crank pin never moves to dead center. Gear 53 meshes with pinion 54 which is fixed to gear 55. The latter engages a rack 56 at the bottom of the carriage 44. Adjustment of the eccentricity of crank pin 52 determines the amplitude of the reciprocating motion of carriage 44, which is reduced by moving crank pin 52 radially outward.

Refer to Figures 1, 2 and 4. The upper rolls 45 and 47 are journaled in conducting brackets 57 insulated from the carriage 44. Between these rolls is a slotted wire guide 58 of insulating material. This guide conforms to the peripheries of the rolls (see Fig. 4). The welt-wire B passes downward from a spool or the like, through the slot 59 in guide 58 (see Fig. 5), so as to be drawn against one or the other of rolls 45 or 47 as the carriage reciprocates. The wire always engages the trailing roller. See Figure 1 in which carriage 44 is moving in the direction of arrow C.

Mounted in journal 61 is a selector switch for connecting one or the other of rolls 45, 47 in the welding circuit. The switch comprises an insulating body 62 with two contactor fingers 63, which selectively engage the two conducting brackets 57. The body 62 is impositively latched in each of its two opposite circuit-closing positions by spring detents 64. It is shifted by lugs 65 which are mounted on guides 43 and respectively engage arm 66 on body 62 as the carriage 44 approaches its opposite limits of motion. The lugs 65 are adjustable to conform to the amplitude of reciprocation of carriage 44 imposed by the adjustment of crank pin 52.

The lower rolls 46 and 48 are carried on conducting brackets 67 which are insulated at 68 from carriage 44. The leads 71 and 72 from any suitable source of welding current (such as the usual transformer, not shown) are attached respectively to contact fingers 63, and to the connector 69 attached to the brackets 67.

The rolls 45, 46 form one welding couple and the rolls 47, 48 another. The two rolls of each couple are so spaced from one another as to clamp and weld each crossing of the welt-wire B upon a warp-wire A.

Suppose that a warp is in place, the current on and the carriage is approaching one of its limits of its motion. As the trailing rolls clear the warp the feed roll 23 is fed one tooth interval and switch body 62 is shifted to deenergize the rolls which had been trailing and energize the others which become the trailing ones on the reverse traverse.

As the carriage starts in the reverse direction, weft-wire B draws against the trailing roll 45 or 47, as the case may be, and is rolled upon and welded to successive warp strands across the breadth of the warp. No side clamps or tenter hooks for the weft strand are needed and none are used.

While one embodiment has been described in detail, this is merely illustrative. It is not essential that the weft strands have the same spacing as the warp strands. It is not essential that they be at right angles to one another, or that they be of the same size, or even that the warp strands run parallel with the length of the fabric. Obviously the carriage 44 and its related contacts can be used in modified forms and in various environments. Since various relations of crossing strands are known, and since the invention is obviously applicable to many of these, no limitation to the specific example here illustrated is implied.

What is claimed is:

1. Means for welding a continuous weft wire in crossed relation to a warp made up of a series of wires, comprising in combination, warp-sustaining means; a reciprocable carrier adapted to embrace a warp sustained by said means; two pairs of welding rolls mounted on said carrier on parallel adjacent axes so that either pair may lead and the other trail according to the direction of motion of the carrier, the rolls of each pair being opposed to each other, one above and the other beneath the embraced warp, and so spaced as to exert welding pressure on a warp and weft crossing; means for reciprocating said carrier to traverse said rolls back and forth across and beyond the embraced warp; a guide for confining a continuous weft strand to passage through the interval between similar rolls of respective pairs, whereby the weft must pass from said guide into contact with whichever one of said rolls is trailing; connections for supplying welding current; selector means operable reversely by the carrier near its opposite limits of reciprocation to interchange the pairs of rolls in the welding circuit and energize the trailing pair; intermittent warp feeding means; and means for operating said warp feeding means as the carrier reverses its motion.

2. Means for welding a continuous weft wire in crossed relation to a warp made up of a series of wires, comprising in combination, warp-sustaining means; a reciprocable carrier adapted to embrace a warp sustained by said means; two pairs of welding rolls mounted on said carrier on parallel adjacent axes so that either pair may lead and the other trail according to the direction of motion of the carrier, the rolls of each pair being opposed to each other, one above and the other beneath the embraced warp, and so spaced as to exert welding pressure on a warp and weft crossing; means for reciprocating said carrier to traverse said rolls back and forth across and beyond the embraced warp; a guide for confining a continuous weft strand to passage through the interval between similar rolls of respective pairs, whereby the weft must pass from said guide into contact with whichever one of said rolls is trailing; connections for supplying welding current; electric switch means shiftable as an incident to reversals of the motion of said carrier and serving to interpose selectively in the welding circuit, the two rolls between which said guide directs the weft strand in such manner that the trailing roll is energized; and feeding means, operable as an incident to said reversals of motion, to advance the path of the carrier relatively to the warp.

3. The combination defined in claim 1 in which the carrier is a generally rectangular elongated frame which encircles the warp, and the welding

rollers are mounted on opposite members of said frame.

4. The combination defined in claim 2 in which the switch comprises a rocking contact-shifting member mounted on the carrier, and fixed stops are provided to engage and rock said member in relatively reverse directions as the carrier arrives at its opposite limits of motion.

5. In a wire-mesh fabric machine, the combination of means for sustaining and feeding a wire warp with the warp strands under tension; guiding means reciprocable transversely of said warp and adapted to lay a wire weft strand back and forth upon said warp and weld it to the warp strands as it is laid on each, said guiding means comprising a reciprocable carrier and two pairs of roller welding electrodes supported thereby on parallel axes transverse to the motion of the carrier, the two rollers of each pair having their peripheries opposed to one another and on opposite sides of the warp, and the weft wire being arranged to enter between rollers of the two pairs on one side of the warp, whereby as the guiding means reciprocates the weft wire is drawn toward and passes between the rollers of the trailing pair in each reciprocation, the rollers of each pair being so spaced that the weft wire guided by the

trailing pair is laid on and pressed against successive warp wires; and means for supplying welding current at least to the trailing pair of electrodes.

6. The combination defined in claim 5 in which means controlled by the reciprocation of the guiding means control the supply of current and direct it selectively to the trailing pair of roller electrodes.

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