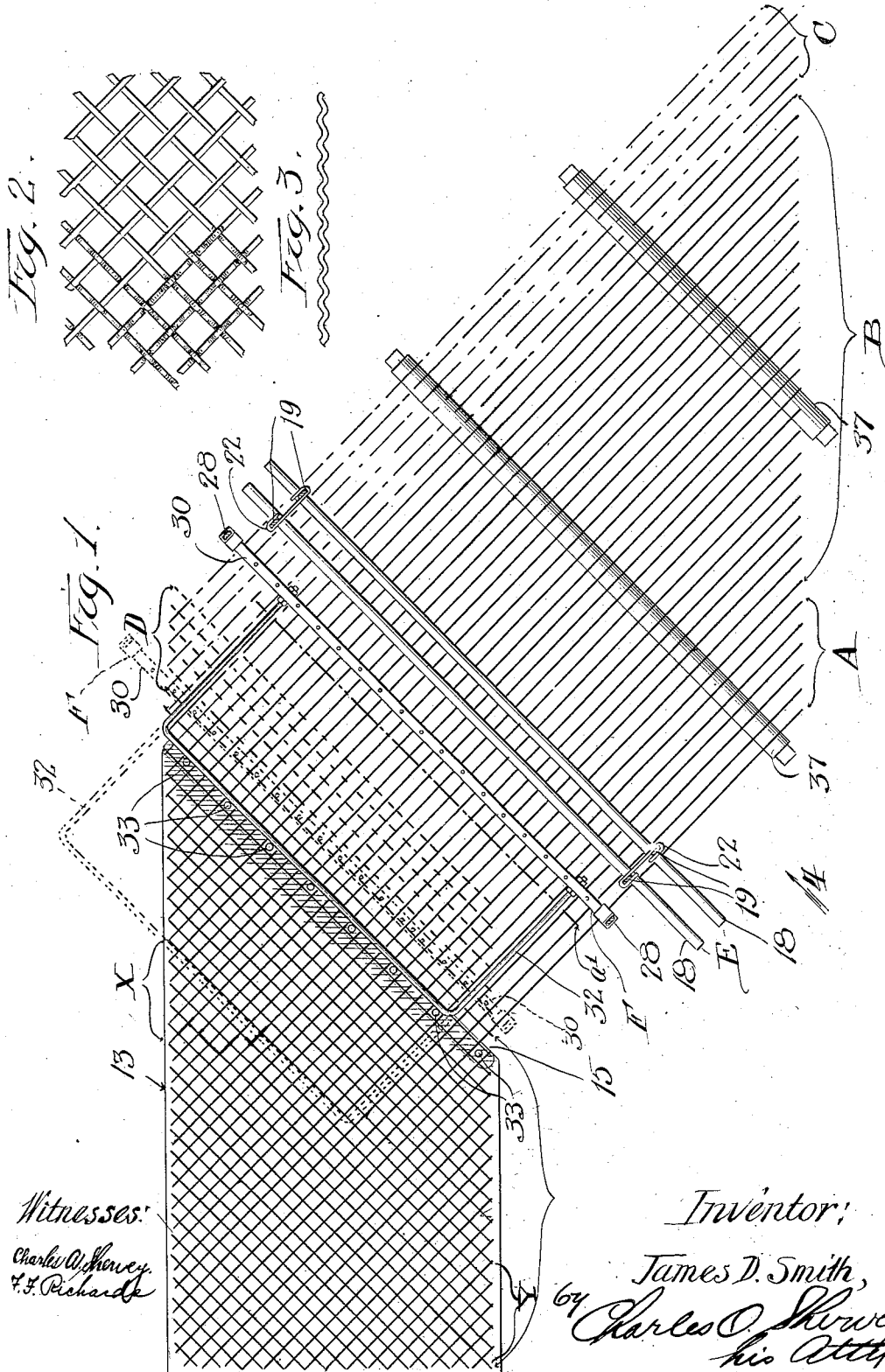


J. D. SMITH.
MACHINERY FOR WEAVING METAL FABRIC.
APPLICATION FILED JAN. 30, 1911.

1,065,561.

Patented June 24, 1913.

3 SHEETS—SHEET 1.



Witnesses:

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J. F. Richards

Inventor:

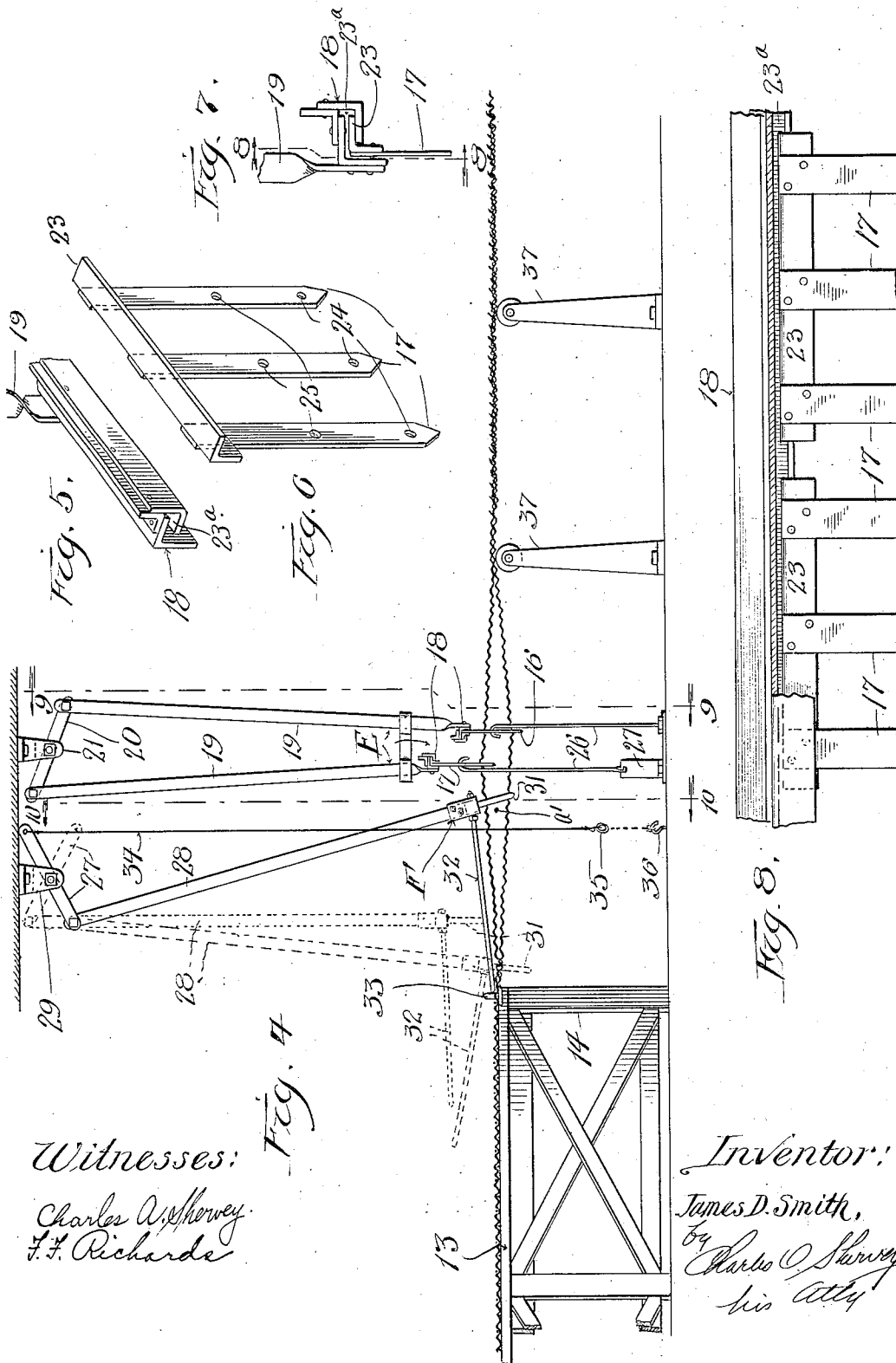
James D. Smith,
Charles O. Shewey,
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Witnesses:
Charles A. Shorway.
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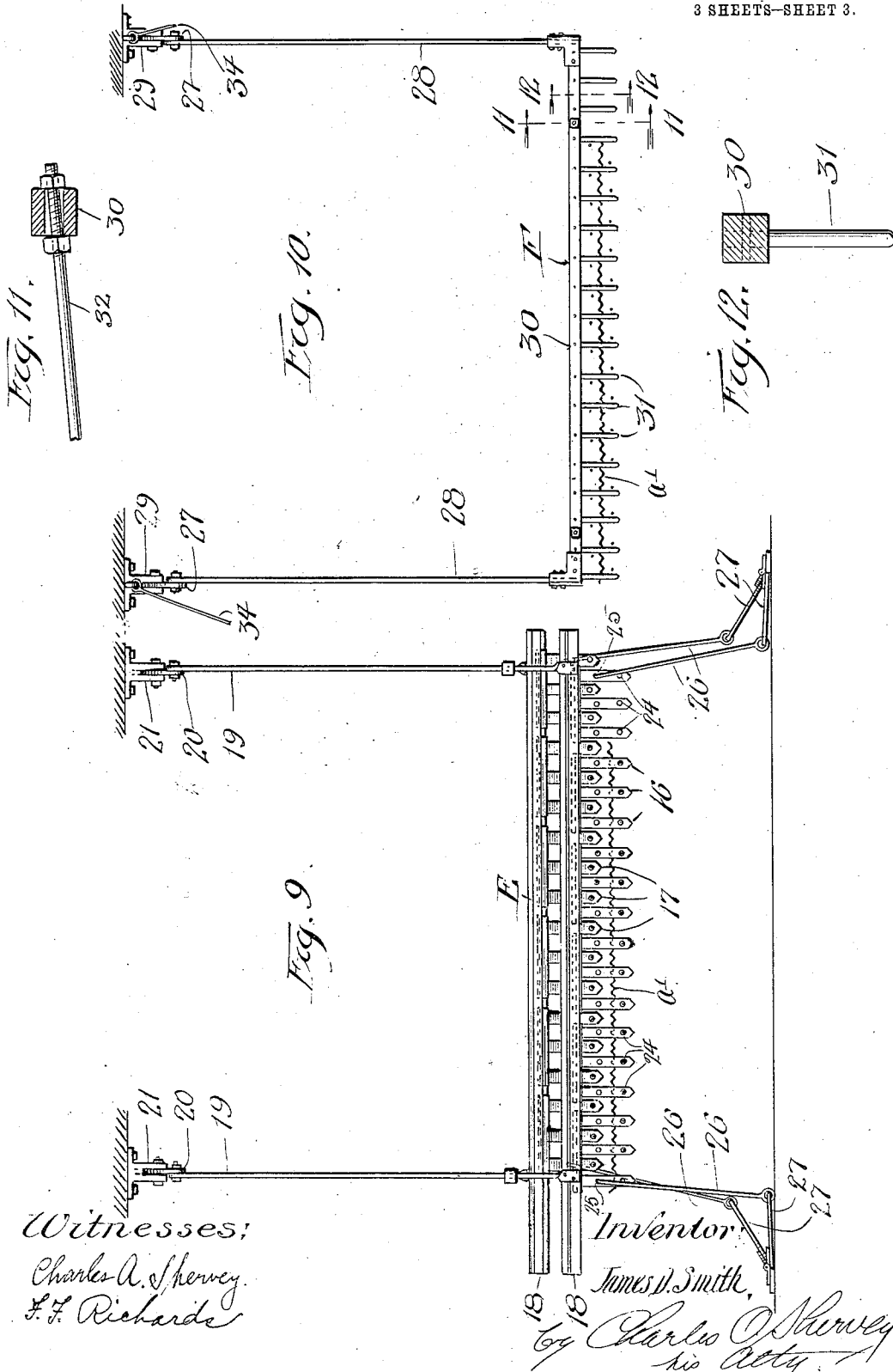
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3 SHEETS—SHEET 3.

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UNITED STATES PATENT OFFICE.

JAMES D. SMITH, OF CHICAGO, ILLINOIS, ASSIGNOR TO FRANKLIN P. SMITH, OF CHICAGO, ILLINOIS.

MACHINERY FOR WEAVING METAL FABRIC.

1,065,561.

Specification of Letters Patent.

Patented June 24, 1913.

Application filed January 30, 1911. Serial No. 605,366.

To all whom it may concern:

Be it known that I, JAMES D. SMITH, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented new and useful Improvements in Machinery for Weaving Metal Fabric, of which the following is a specification.

This invention relates to machinery for weaving metal fabric, particularly metal fabric of that class comprising diagonal strands that are interlaced to form quadrangular meshes, commonly known as "diamond mesh" fabric. Metal fabric of this kind is made of wires or rods of large or small diameter, and considerable difficulty is experienced in weaving the heavier grades of fabric of this kind.

The object of this invention is to provide a simple metal fabric weaving machine whereby "diamond mesh" fabric of continuous length may be woven from short length wires or rods thus affording a great saving of time and labor.

To such ends this invention consists in a metal fabric weaving machine having its weaving mechanism obliquely disposed with respect to a line running longitudinally of the completed fabric, said mechanism being provided with slidable heddles for guiding certain of the wires or rods to the fabric in oblique lines, whereby angularly disposed wires or rods of short length, may be interlaced to form a fabric of continuous length.

The invention further consists in the novel features of construction, arrangement and combination of parts hereinafter set forth and particularly defined in the claims.

The invention is clearly illustrated in the drawings furnished herewith, of which—

Figure 1 is a plan of a machine embodying my invention, with the supporting arms of the harness and batten shown in horizontal section; a section of the fabric, part of which is in the course of construction appears in the view, Fig. 2 is a plan of a fragment of the fabric made by the machine, Fig. 3 is a side elevation of a fragment of one of the wires or rods of the fabric, Fig. 4 is a side elevation of the machine looking in the direction of the arrow 4, in Fig. 1, Fig. 5 is a perspective view of a fragment of a carrying bar of the harness, Fig. 6 is a perspective view of a group of connected heddles, Fig. 7 is an end view of a fragment

of one section of the harness, Fig. 8 is a view partly in side elevation and partly in vertical section of a carrying bar and two groups of heddles, the line of section being indicated at 8—8 Fig. 7, Fig. 9 is a face view of the harness as viewed from the section line 9—9 of Fig. 4, Fig. 10 is a face view of the batten as viewed from the section line 10—10 of Fig. 4, Fig. 11 is a detail, vertical cross section taken on the line 11—11 of Fig. 10, and Fig. 12 is a detail vertical cross section taken on the line 12—12 of Fig. 10.

In constructing "diamond mesh" metal fabric of any given width, by hand, the wires or rods are first kinked and cut to lengths. The length of a wire or rod and its angular position in the fabric, determine the width of the fabric. A number of wires are arranged parallel with each other and oblique with respect to the length of the fabric, and other wires arranged crosswise of the first set midway between their ends, and interlaced therewith. Other wires are added and interlaced to complete the fabric.

In using this machine, double length wires or wires whose length is any multiple of a single length wire, are employed in the construction of the fabric, one part of each wire being placed in a diagonal line in the fabric, and the other parts of the wires being cut off during fabrication to provide wires for the other diagonal direction. For convenience I will term the long wires or rods "double length" wires and the short or severed portions "single length" wires.

Referring to said drawings which illustrate a simple form of the invention, a table or platform is represented at 13, said table being mounted upon legs 14, and having its end adjacent to the weaving mechanism of the machine, obliquely disposed, as seen at 15 (Fig. 1). The angle of the oblique table end 15, is fixed as that angle assumed by one set of the diagonal wires of the completed fabric, and the batten and harness are arranged approximately parallel with said oblique end 15, as seen in Fig. 1. On the oblique end means are provided for holding the fabric in position during the course of construction, one form of means comprising upwardly projecting pins 33. It is obvious that in place of providing the table itself with an oblique end, the holding means alone may extend obliquely with respect to the

length of the fabric, deposited upon the table from the weaving mechanism, and in that case the latter should extend approximately parallel with said holding means.

Beside the oblique holding means is the harness E, for guiding the "double length" wires or rods, said harness acting to form a "shed" through which the "single length" wires are inserted between the "double length" wires. Said harness is shown as having two sets of heddles 16, 17, that are slidably mounted in carrier bars 18, supported in any desirable manner, as for instance by arms 19, connected to the ends of oscillatory cross bars 20, fulcrumed intermediate their ends on suitably supported brackets 21. In the form shown, the carrier bars of the heddles are arranged above the work and the arms extend upward therefrom to the bars 20, the brackets 21, being supported from above, as for instance by bolting them to a support above the bars 20. For convenience the lower ends of the arms may be guided by loops 22, sliding upon said arms and arranged to maintain the two sections of the harness in spaced relation to each other.

The heddles of each section of the harness are arranged to travel from one end of the carrier bar 18, to the other end in the operation of the machine, and for convenience the heddles are arranged in groups, connected together as by a connecting bar 23, secured to their upper ends (seen in Fig. 6). Each group of heddles is guided to move along its carrier bar and as shown a convenient means for accomplishing this result comprises a horizontal groove 23^a in the carrier bar adapted to receive one flange of the heddle connecting bar 23. The particular construction of said carrier bar is immaterial to the invention, broadly speaking, and I have shown it built up of angle irons (see Fig. 7) to form the L shaped groove for guiding the heddles in their movement from one end of the carrier bar to the other. Each heddle has an eye 24, at its lower end for receiving and guiding the "double length" wires. For convenience, an opening 25, is provided in the heddle, into which may be hooked the end of a link 26, which extends upward from a treadle 27. In the form of machine illustrated there are four treadles, and the links are hooked into the openings 25, of the heddles at the end of the harness. Normally both sections of the harness would lie opposite each other, that is, in the same horizontal plane, but for the purpose of illustration, one section is shown as depressed and the other raised to separate the wires to form the shed, it being understood that depression of one of the treadles will draw down one section of the harness swinging the bars 20, upon their fulcrums, and raising the other section

of the harness. As is customary, the heddles of one section are offset or staggered with respect to the heddles of the other section, so that the alternate wires will be raised and lowered in unison, in opposition to the intermediate wires.

The batten F, is located between the harness and oblique securing means; and is shown as carried by arms 28, extending down from levers 27, said levers being fulcrumed between their ends on brackets 29, supported in any suitable manner. A cross bar 30, connects the lower ends of the arms 28, and projecting down from said bar 30, are pins or prongs 31, that extend down between the "double length" wires and engage with the "single length" wire to force it into place. A handle, preferably in the form of a bail 32, is employed for swinging the batten, said bail being loosely connected to the cross bar 30, as shown in Fig. 11, whereby it may have a limited amount of vertical movement, and be capable of falling in front of the positioning pins 33, that project up from the end of the table 13. By swinging the batten toward the harness (see full lines Fig. 4) and dropping the handle in front of the pins 33, the batten is held in position ready for the insertion of the "single length" wire. The batten may be drawn forward by first disengaging the handle from the pins 33. Means are provided for withdrawing the batten from the work and as shown a simple form of means comprises a wire or other connecting device 34, extending down from the free end of each lever 27, and having an eye 35, arranged to be hooked upon a hook 36, secured in the floor. By drawing down both connecting devices, 34, and hooking the eyes upon the hooks 36, the levers 27, are swung upon their fulcrums, the arms 28, raised and the batten lifted clear of the work.

The prongs are shown as stationarily secured in the supporting bar, but it is obvious that they may be adjustable or movable as are the heddles 16, and likewise arranged in connected groups.

Beyond the harness are placed one or more supports 37, for receiving and carrying the ends of the "double length" wires during the process of forming the metal fabric. Any desirable form of support may of course be employed for this purpose.

In constructing metal fabric with this machine, kinked wires are used, each wire being twice the length of wire required in a fabric of any given width, or wires any desired multiple of that length are used, and the proper number (depending upon the mesh and width of the fabric) threaded through the eyes of the heddles, bringing one end of each wire to a line on the table coinciding with the far edge (as viewed in Fig. 1) of the fabric to be constructed. The

wires embraced in the groups lettered A, B, C, comprise the number of double length wires required to make one diagonal section X, Y, of the completed fabric of the width and mesh illustrated in Fig. 1, and those embraced in the group D, comprise the required number of single length wires and correspond to the numbers in the group A or C. The number of wires in the groups A, C, D, may be increased or diminished, depending upon the space between the oblique end of the table and the batten, care being taken to not completely build up said space before advancing the finished fabric for making the next succeeding section. Either before or after the double length wires have been placed, those embraced in the groups A, B, are interlaced with short length wires in that portion of their length lying on the table, this being done by hand in the usual way, merely for the purpose of starting the fabric. This may be done by cutting off the longest piece of wire lying on the table, and interlacing it with the others, then cutting off the next longest one and interlacing it with the others and so on until a square, finished end is completed. Obviously this is not necessary to the operation of the machine, but for the purpose of economy, the fabric may be thus started as none of the material is wasted. A group of single length wires D, is then prepared for starting the manufacture of the fabric by the machine. The batten is then swung back into the position shown in full lines in Fig. 4, and the treadles of one harness section depressed by the attendants, there being two in the operation of the machine of the form shown. Depression of said treadle causes a depression of the harness section directly connected therewith, and a corresponding raising of the other harness section, thus forming a shed between the alternate and intermediate wires. One attendant then inserts a single length wire (indicated by dotted lines *a'*) through the shed in front of the batten prongs, after which the attendants raise the handle and draw the batten forward, crowding the single length wire between the alternate and intermediate double length wires until it reaches the proper position relative to the next adjacent, previously inserted single length wire. The remaining wires of the group D, are inserted and crowded to place, each succeeding wire of the group being inserted far enough to reach that double length wire next to the one where the end of the previously inserted short length wire stopped, so that when all of said short length wires have been inserted and crowded to place, their ends will lie in lines coincident with the edges of the completed fabric, as shown by the group of wires indicated in dotted lines at D. It is of course understood that

the harness is operated to raise one series of the double length wires and lower the other series for one single length wire and thereafter to lower the first series and raise the other series for the second single length wire and so on to effect the interlacing with the single length wires. The attendant on the near side of the machine then cuts off the wires of the group A, at the edge of the finished fabric, draws them out of the eyes of the heddles which guided them, after which they are used to build up another diagonal section of the fabric. The attendant unhooks the links 26, from the heddles and removes the two groups of heddles at the end of the harness where the groups of wires A, extended, said groups of heddles being subsequently inserted in the carrier bars at the other side of the machine. The batten is then raised out of the work by pulling down the connecting devices 34, and securing it in place, after which the attendants disengage the finished fabric from the pins 33, and advance it along the table, bringing the finished diagonal edge into engagement with the pins whereby it may be held in proper position for the next step of operation. The advancement of the completed fabric in a line longitudinal of itself consequently shifts the several groups of heddles forward along their carrier bars, by reason of the fact that the diagonal double length wires are moved bodily in the same direction as the completed fabric, the near wires assuming the position formerly occupied by the group A, and the far wires moving away from their original position, leaving a space formerly occupied by the group C. The attendant on the opposite side of the machine now inserts the previously removed heddles into the carrier bars so as to occupy the space left by the advancement of the heddles therein, and then inserts a group of wires (C) through the eyes of said groups of heddles, bringing the ends of the wires into alinement with the far edge of the finished fabric. The former operation of inserting the single length wires is then repeated.

From the above it is obvious that metal fabric having interlaced diagonal strands may be made economically in continuous length from short wires or rods. I prefer to use double length wire or rods for the sake of economy, as the severed portions of the wires or rods are conveniently used in completing the fabric, but the use of double length wires or rods is not essential to the operation of the machine, as any multiple of the initial length may be successfully used and while I have shown and described a form of machine for making comparatively heavy metal fabric, in which the wire or rods are previously kinked before being operated on by the machine, I desire it to be

understood that the machine may be employed for weaving fabric of light construction in which the strands are not necessarily kinked prior to being fed into the machine.

5 The machine is however particularly adapted for use in weaving metal fabric from wires or rods of sufficient stiffness to be inserted through the shed without the aid of a shuttle.

10 I realize that various alterations and modifications of this device are possible without departing from the spirit of my invention, and I do not therefore desire to limit myself to the exact form of construction shown and described.

15 I claim as new and desire to secure by Letters Patent:

1. In a weaving machine, a harness section comprising a carrier bar having longitudinal guiding means, a plurality of rigid
20 movable heddles arranged in groups and each having an eye therein for the reception of a fabric wire, said heddles being free and unconnected at one end, and bars rigidly
25 connecting the other ends of the heddles of each group, and having means cooperating with the guiding means on the carrier bar to slidably connect the heddles therewith.

2. In a machine for weaving diagonal,
30 strand fabric, the combination with a support arranged to receive the completed fabric woven by the machine, and means for temporarily holding said fabric in place, of harness mechanism arranged approximately

parallel with one series of the diagonal 35 strands of the fabric and comprising two vertically reciprocable open-ended trackways, heddles guided to move therein, supporting mechanism for said trackways, including means for reversing the direction of
40 movement of one trackway with respect to the other and treadles for each trackway whereby either trackway may be drawn downward.

3. In a machine for weaving diagonal 45 strand fabric, the combination with a support arranged to receive completed fabric woven by the machine, of a pair of vertically reciprocal open-ended trackways arranged approximately parallel with one 50 series of the diagonal strands of the fabric, supporting bars therefor, each pivoted midway between its ends, and links connecting the ends of said bars with said trackways, whereby movement of one trackway is re- 55 versed with respect to the movement of the other trackway, slidable wire guiding heddles carried by said trackways, and treadles connected to each trackway whereby either one of the latter may be depressed.

In witness whereof, I have hereunto signed my name at Chicago, Cook county, Illinois, this 24th day of January 1911.

JAMES D. SMITH.

Witnesses:

EDWARD MCCLURE,
ROBERT R. BARNITT.