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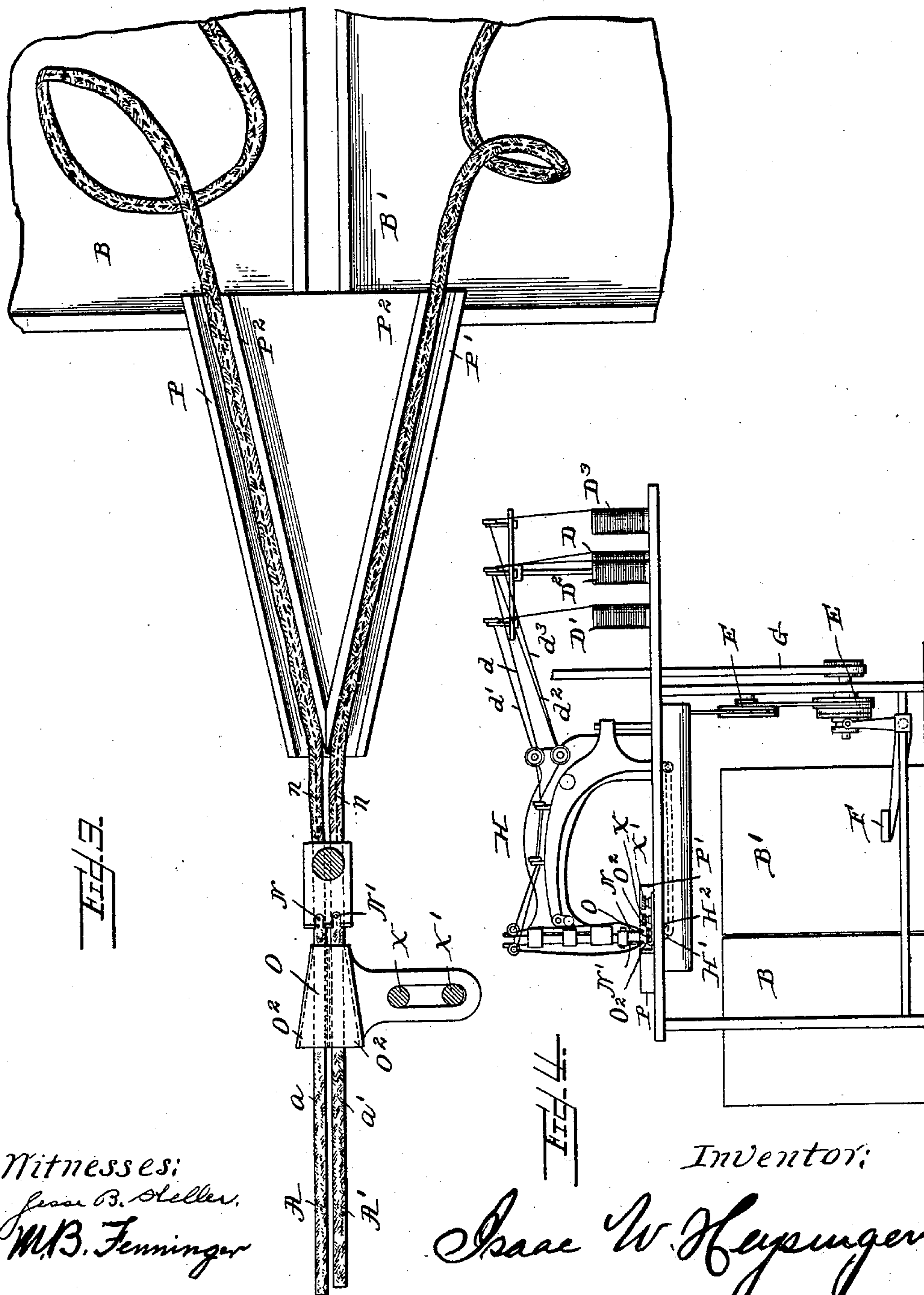
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**MEANS AND APPLIANCES FOR THE MANUFACTURE OF COVERED STRIPS OF SOFT METAL FOR ELECTRICAL OR OTHER PURPOSES.**

(Application filed Dec. 4, 1901.)

(No Model.)

**2 Sheets—Sheet 2.**



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# UNITED STATES PATENT OFFICE.

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MEANS AND APPLIANCES FOR THE MANUFACTURE OF COVERED STRIPS OF SOFT METAL FOR ELECTRICAL OR OTHER PURPOSES.

SPECIFICATION forming part of Letters Patent No. 706,053, dated August 5, 1902.

Application filed December 4, 1901. Serial No. 84,623. (No model.)

*To all whom it may concern:*

Be it known that I, ISAAC W. HEYSINGER, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a certain new and useful Improvement in Means and Appliances for the Manufacture of Covered Strips of Soft Metal for Electrical or other Purposes, of which the following is a full, clear and exact description, reference being made to the drawings which accompany and form a part of this specification, in which—

Figure 1 is a side view of two braiding-machines, one partially behind the other, two soft-metal strips passing through the same and receiving coatings of cement and coverings of braided fabric and thence passing to suitable reels and afterward to receptacles from which the said strips pass to and through the double guide-passages under the double needles and through the sewing mechanism of a double-needle sewing-machine and afterward through suitable guideways into the receptacles at the right-hand side and beyond said sewing-machine. Fig. 2 is a top view of a strand or length of said finished material of soft metal, with its coating of cement, its covering of braid, and its row of lock-stitches through braid, cement, and metal, said length in Fig. 2 being shown as transversely divided into suitable lengths for use. Fig. 2<sup>a</sup> is a longitudinal section through the line of stitches of b<sup>2</sup> of Fig. 2. Fig. 2<sup>b</sup> is a cross-section of 2<sup>a</sup> at any point where a stitch perforates the metal. Fig. 3 is a top view removed from the sewing-machine of the double-apertured guide-passages through which the strands pass to the needles of the presser-foot, which holds the same down upon the reciprocating feed mechanism, and of the guideways through which the finished product is caused to diverge one strand from the other and fall into separate receptacles; and Fig. 4 is a front view of the double-needle sewing-machine with guide-passages to the needles and receptacles for the finished product beyond.

The lettering in all the figures is uniform.

The object of my invention is to produce a long flat strip of soft metal, such as copper, lead, or some soft-metal alloy, which is first covered in the machine with a coating of liq-

uid cement, then a braided covering of cotton or like material applied to said coated strip while still wet with the liquid cement, then the covering rolled flat to embed the same in the cement and on or in the surfaces of the metal, and to then pass the said covered and cemented strip through a suitable sewing-machine, preferably a continuous-spool lock-stitch machine, and afterward divide the same transversely into suitable lengths for use. The stitched seam thus perforates the metal through its flat sides, and the whole is permanently secured together, so that it may be divided into lengths, long or short, without the possibility of the covering being loosened or detached from the metal strip within, while when thus cut into lengths the cemented ends will prevent the covering from fraying or unraveling, so as to expose the metal. I thus produce, by using a soft copper strip within, a highly-insulated electrical conductor, of any length desired, flat in cross-section, and adapted to be tacked or stapled to a wall, the corner of a room, or the like, and which will be extremely inconspicuous, and which can be readily cut into lengths by an ordinary pair of scissors, or the like, on account of the flatness of the material, without impairing or crushing or dislocating the coverings secured thereto. To render these in use still less conspicuous, I prefer to make the braided covering of a color to correspond, to some extent, at least, with that of the material to which it is to be applied—as, for example, black, brown, drab, or white. When I desire, I use for the metal strip lead or other soft non-elastic metal or a suitable alloy thereof, and in such cases I do not employ the material for the purposes of electric conduction, but for purposes to which a cheaper material—as, for example, in short lengths suitably boxed and sold, tying up packages, fastening strands of ladies' or children's hair, stiffening garments, or the like—the free ends of the projecting strands as covered and completed being bent over or twisted together as may be desired. The means and process of manufacture are the same in all.

If desired, I pass the braided and cemented material through a braiding-machine twice or three times before running it through the



sewing-machine, thus greatly increasing the insulation for electrical purposes or the bulk and softness when used for other purposes, as above described. The cement I prefer to use is a thick solution of dextrin in hot water, to which a few drops of glycerin are added to prevent drying out and cracking; but, if preferred, I use liquid marine glue, gutta-percha solution, some preparation of india-rubber, or any other suitable cementing solution which will firmly adhere to metal, as a mineral paint in oil or turpentine or the like.

Referring to the drawings, at the left-hand side of Fig. 1 are shown two braiding-machines represented somewhat diagrammatically, four spools or bobbins  $S S S S$  being shown in each; but I use eight, twelve, sixteen, or more in practice, according to the requirements of the article. These as they rotate in involved curves around the center lay a braided interwoven covering of diagonal threads  $T T T T$ , as shown in Figs. 1 and 2, directly upon the metal strips  $m m$ , which pass up through the centers of the machines from the spools  $V^4 V^4$  below, being bent in their ascent to pass through the cementing solutions  $V' V'$  in the pans  $V V$  around the rollers  $V^2 V^3 V^2 V^3$ . After passing through between the braiding-bobbins the covered strips are compressed by the corrugated feed-rolls  $W' W'$ , two for each machine, and which are driven by the worm-gears attached to the vertical shafts at the left-hand side of the feed-rolls, which in turn receive motion from the machines below. These feed-rolls compress the covering down onto the metal strip already laden with the cementing solution and force the cement into the interstices of the coverings of fabric and in soft metal partially embed the thread of said coverings into the metal within. The feed-rolls are the means by which the strips are drawn up through the braiders. Passing on vertically upward the covered strips are wound around the reels  $A$  and  $A'$ , one for each machine, taking one or several turns around the said reels to insure traction. These reels are operated by the preferably round friction-belts  $r' r'$ , also driven from beneath. These belts are slip-belts, and having a motion in excess of that of the feed of the covered strips they will always hold the said strips taut between the feed-rolls beneath and the take-up of the reels above. When special dryness of the material is required before stitching, I sometimes reel up the covered fabric on the reels in layers until the reels are full and detach and dry them separately before completing the process; but the drawings illustrate the means adapted for the continuous process, as described. From the reels  $A A'$  the cemented and covered strips enter the receptacles  $A^2 A^2$ , where they accumulate to compensate for the variable speed or operation of the sewing-machine. (Shown at the right-hand side of Fig. 1 and in front view in Fig. 4.) They may also be taken directly from the reels  $A' A'$  instead of through

the interposed receptacles  $A^2 A^2$ . The sewing-machine seen in end view in Fig. 1 is clearly shown in front view in Fig. 4 and the feed mechanism detached in Fig. 3.

A single braider and single-needle sewing-machine may be used, and the latter may be a shuttle-machine, if desired; but I prefer and use in practice a double-needle lock-stitch machine or a multiple-needle machine, one needle for each strand of material, the needles operated simultaneously by the same needle-arm and the loop-forming mechanism below in the same manner. Four large spools are shown at  $D D' D^2 D^3$ , the threads from two of which,  $D D^2$ , pass through the circular tensions to the needles  $N N'$  and the threads from  $D'$  and  $D^3$  through the opposite tensions (shown in Fig. 1) above and below. These machines can be driven at a very high speed and by their sudden blow strike holes in the metal strip without heating the needle and almost without resistance, provided there is sufficient power and weight of arm and speed.  $H'$  and  $H^2$  indicate the location of the loop-forming devices, which are covered up, as shown.

On the top plate of the sewing-machine I detachably and adjustably secure by the screws  $x x'$  the double-passaged feed-guide  $O$ , having passages  $O^2 O^2$  directly through the same parallel with each other and adapted to guide two separate strands of covered material  $A A' a a'$ , Fig. 3, as shown, each directly and centrally under its appropriate needle  $N$  or  $N'$ . These needles pass down between the front of the presser-foot and the rear of the passages  $O^2 O^2$ , the feed being located directly beneath. After passing the presser-foot the two strands of fabric-covered metal enter the divergent guideways  $P P'$ , mounted on  $P^2 P^2$ , and overhanging the receptacles or holders  $B B'$ , which I prefer to make wheeled boxes, the wheels, in whole or part, being rotating casters, and the finished covered, cemented, and sewed-through soft metal-strips pass separately into these large open boxes, in which they coil up on the lines of least resistance, so that when taken out by reversing the process they are readily fed through a cutting-machine and divided transversely into suitable lengths or spooled up for the market. Instead of these receptacles  $B B'$ , I sometimes use reels, as at  $A A'$ , Fig. 1, if desired.

$a^2 a^2$  are small friction-rolls to expedite the exit of the strands from the receptacles  $A^2 A^2$ .

$b b'$  are the finished products entering the boxes  $B B'$ .

$G G'$  represent the power-belt driving the sewing-machine and other appliances, if desired.

$F$  represents the foot-treadle to stop or start the sewing-machine, an operator sitting in front of the same to conduct and supervise the operation thereof.

$E E$  are the usual speeding-pulleys for the sewing-machine and their connected belts.



In Fig. 2, *m* represents the metal strip; *b*, the covered fabric as it appears when first delivered, *d*<sup>2</sup> and *d*<sup>3</sup> being the ends of the stitching and *b*<sup>2</sup> *b*<sup>2</sup> the completed goods as transversely divided into lengths.

In Fig. 4 the operation of the treadle *F* on the clutch is clearly shown.

*Y Y* in Fig. 1 are guides for the covered fabric from the reels *A A'* to the receptacles *A<sup>2</sup> A<sup>2</sup>*, if required.

I do not in this application rigidly confine myself to the precise constructions and details of combination herein specifically set forth, but vary the same according to the special requirements of the case, as would be done by any mechanic skilled in the art and without departing from the principles of my invention as herein shown, described, and claimed.

Having now described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The conjoined means for the manufacture of covered strips of soft metal consisting of one or more braiding-machines provided with a cup beneath adapted to hold a supply of liquid cement, guides adapted to carry a continuous soft-metal strip down through said cement and thence up to and through said braiding-machine, feed-rolls adapted to pass said strip through said machine continuously, a twin-needle sewing-machine adapted to receive two of said covered soft-metal strips from said braiding machine or machines, twin guide-passages adapted to direct each strand separately beneath its appropriate needle in said machine, and suitable means for subsequently receiving said completed fabric in separate strands, substantially as described.

2. In the manufacture of flat, cemented and covered strips of soft metal, having a stitched seam through the said metal strips along the flat sides thereof, and through said coverings, along the length thereof, the combination of a multiple or twin needle lock-stitch sewing-machine, with a multiple or twin guide, having separate and parallel guide-passages through the same, one for each strand of material, and adapted to deliver said strands separately, one under each needle of said machine, and above the loop-forming mechanism thereof, said needles adapted to operate simultaneously and perforate said coverings and said inclosed metal strip, and stitch the same securely together from end to end, substantially as described.

3. In the manufacture of multiple strips of flat metal, covered with coverings of fabric separately braided thereupon, a multiple-needle sewing-machine adapted to simultaneously form a lock-stitch seam along and through the flat sides of each of said strips and the covering thereof, and a guide having parallel multiple guide-passages through the same adapted to present said covered strips separately to the needle and loop-forming

mechanism of said sewing-machine, and multiple guideways to deliver the separate covered and stitched strips each to a separate receptacle therefor, substantially as described.

4. In the manufacture of soft-metal strips having braided and cemented coverings, a twin or multiple needle sewing-machine, in combination with two or more reels adapted to deliver said covered strips to the needle and loop-forming mechanism of said sewing-machine, and guide-passages, one for each of said strips, directed each to one of the needles thereof as they operate, said machine adapted to simultaneously stitch twin or multiple covered strips through said coverings and said inclosed soft-metal strips within the said coverings, substantially as described.

5. In the manufacture of soft, flat metal strips, covered with a textile fabric continuously cemented to said inclosed metal strip, said cement applied in liquid form to said strips and dried in contact therewith and with said coverings, said covered and cemented strips subsequently stitched together by a continuously-sewed seam passing through the flat surfaces of said covering and metal strip, a twin or multiple needle sewing-machine, and in combination therewith a guide having parallel and twin or multiple guide-passages, one for each of a series of said strips, feed mechanism adapted to simultaneously present and deliver said strips into said sewing-machine, and simultaneously stitch each of said series, and subsequently and continuously deliver said strips separately to different and independent receptacles or holders, substantially as described.

6. In combination with two or more braiding-machines, each provided with a separate cup for holding liquid cement, and with spools of thread for forming a braided covering around a flat soft-metal strip, and with means for passing said strip through said cement and through said braider, and for applying a coating of liquid cement to said strip and immediately afterward braiding a braided covering of fabric around said wet strip, and means for feeding and drying the said strip through said machine, and for passing said strip through a sewing-machine and applying a stitched seam sewed through said covering and metal strip, means for feeding said covered strip through a sewing-machine, adapted thereto, together with a guide-passage to direct said covered strip thereto, and means for subsequently delivering said completed cemented, covered and stitched strips to separate receptacles adapted therefor, and from which said strips are adapted to be cut up transversely into suitable lengths for use, substantially as described.

7. In combination with a twin or multiple needle sewing-machine, a detachable and adjustable guide for twin or multiple strips of soft metal, having parallel guide-passages through the same and directed, one passage-way to each of said needles, and exit guide-



passages beyond said needles, one for each of said strips after the same have been stitched, the whole constructed to operate substantially as and for the purposes described.

5 8. The means and appliances for manufacturing cemented and braid-covered strips of soft metal, consisting of a braiding-machine having cup of liquid cement, and spools of suitable thread, and means for passing a  
10 strip of soft metal successively through said cement and braider, a sewing-machine having a guide-passage adapted to direct said cemented and braided metal strip to the needle mechanism thereof, means for passing  
15 said strip through said sewing-machine and directly beneath the needle thereof, adapted to make a stitched seam through said covering and said metal, and means for taking up the finished product after passing through  
20 said sewing-machine, substantially as described.

9. The means and appliances for manufacturing cemented and braid-covered strips of soft metal, said covering and strip stitched  
25 together by a continuous lock-stitch seam, consisting of a braiding-machine having means for applying a coating of liquid ce-

ment to a covered strip passing through the same, and subsequently braiding upon it a covering of textile material, a sewing-machine having suitable guideways and feed  
30 mechanism, and adapted to pass the same therethrough and make a stitched seam through said cemented and covered metal strip, substantially as described. 35

10. In combination with the needle and loop-forming mechanism and feed of a twin or multiple needle sewing-machine, the detachable and adjustable parallel multiple  
40 guide-passages  $O^2 O^2$ , each passage adapted to deliver a strand of covered fabric separately thereto, said fabric of soft metal covered with soft textile covering, and said sewing-machine adapted to make a separate row  
45 of stitches through each of said covered metal strips, and a corresponding series of divergent delivery-guides,  $P P'$ , from said needles to a receptacle or holder for each of said covered and stitched strips, substantially as described.

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Witnesses:

GEO. W. REED,

M. B. FENNINGER.