(No Model.)

I. W. HEYSINGER.

HAIR CRIMPER.

No. 418,515. Patented Dec. 31, 1889.

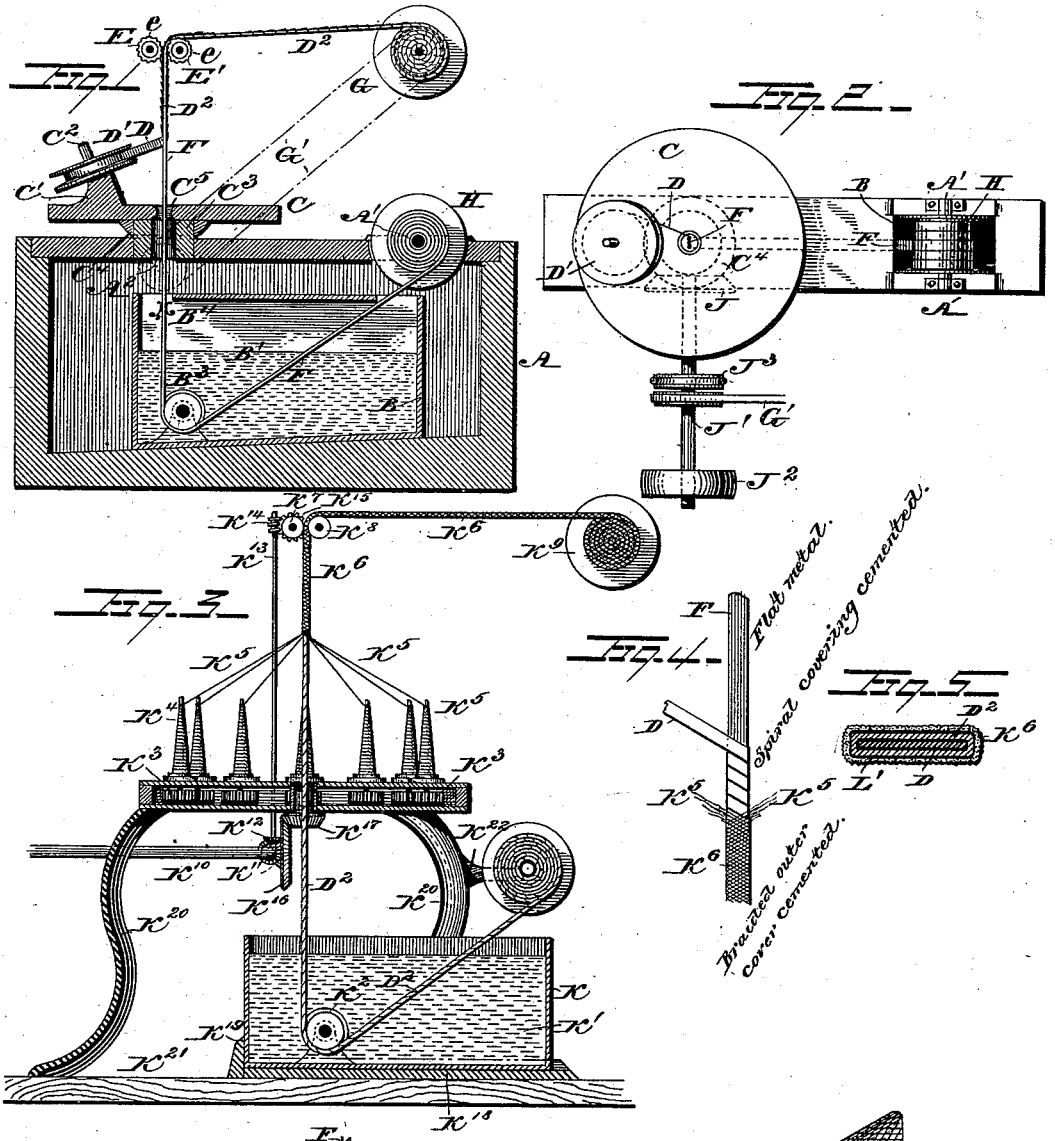

Fig. 1

Fig. 2

Fig. 3

Fig. 4

Fig. 5

Fig. 6

Fig. 7

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HAIR-CRIMPER.

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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 made a certain new and useful Improvement in Hair-Crimpers and the Manufacture thereof, of which the following is a full, clear, and exact description, reference being had to the drawings which form a part of this specification, in which—

Figure 1 is a longitudinal vertical section of the winding apparatus, showing the method of applying the first or overlapping spiral covering of fabric to the metal core-strip and cementing the same thereto. Fig. 2 is a top view of the same, showing the gearing in dotted outline beneath. Fig. 3 is a longitudinal vertical section of braiding apparatus, showing the method of applying the braided outer covering of fabric to the overlapped spiral inner covering of the flat metal core-strip and cementing the same thereto. Fig. 4 is a side view of a length of finished crimper-stuff, in which the braided covering and the inner overlapped and spiral wrapping have been partially unwound from the inner flat metal core-strip. Fig. 5 is an enlarged cross-section of a finished crimper, showing the inner soft-metal flat core, the overlapped spiral wrapping with the interposed layer of cementing substance, the outer braided covering and the layer of cement between the same, and the plicated or overlapping spiral wrapping beneath. Fig. 6 shows the construction of the plicated covering of paper or the like with its overlapping edges uncemented from want of contact with the core-strip wet with cement, and illustrating in its bent portion the flexibility gained by the transverse plications of said wrapping; and Fig. 7 is a perspective view of a finished crimper, as herein described and claimed.

The lettering in all the figures is uniform.

My invention relates to the construction of a hair-crimper composed of a strip of soft substantially-inelastic metal adapted to have a strand of hair wrapped in successive layers around the same and secured by bending the projecting ends of the crimper around or beneath the ends of said strand of hair, in which the said soft-metal strip is increased in bulk and softness, without essential impairment of its flexibility, by an inner layer of non-metallic fabric—such as tough soft paper, leatheret, cloth, or the like—said layer applied to the said soft-metal strip in a spiral forming a continuously-wound coating from end to end, said coating thus applied being cemented to the metal core-strip continuously from end to end, and having also an outer layer or covering of braided fabric braided over the said inner layer and continuously cemented thereto from end to end.

My invention also consists in providing the said flat metal flexible core-strip with a spiral covering of paper or like fabric applied in a flat strip to the surfaces of said core-strip and cemented thereto, as the same is wound around the said metal core-strip, in which the edges of the spirally-wound strip overlap each other in a plicated form, like the scales of fish and other animals, the said plicated or overlapping surfaces being in whole or part uncemented together, so that when the said crimper is flexed the plicated folds are enabled to move upon each other, so that the flexibility of the soft-metal core-strip beneath is not essentially impaired, while a greatly-increased bulk and softness may be readily obtained by increasing the thickness of the paper which forms the spiral wrapping, or by repeated applications of the same.

My invention also consists in producing such soft-metal crimpers having a wound or overlapped inner wrapping and a braided covering in continuous lengths of crimper-stuff adapted to be subsequently cut up into crimpers of a suitable length, the coverings cemented or made firmly adherent to the soft-metal core-strip continuously from end to end by a double coating of cement, one coating applied between the said spiral wrapping and the soft-metal strip and the other coating between the braided covering and the outer surface of the said spiral wrapping.

My invention also consists in providing this spiral wrapping of paper cut into suitable strips, and of a color corresponding to the color of the braid to be applied thereto—black, brown, blonde, or the like—and braiding the outer cover in a braid of like color, but with open mesh, so that the said inner layer of spirally-wound and plicated paper may show

through the said meshes, the whole compressed between feed-rolls to produce a reticulated ornamental pattern, the plications of the said paper wrapping held in place where they cross over the said strip diagonally by the strands of the outer covering of braid without essentially impairing the flexibility of the soft-metal core-strip of said crimper.

My invention also relates to and consists of the methods of manufacture of the said hair-crimper, as will be fully described hereinafter, and to the other specific details described and claimed in this specification, including such uses as the said article may be adapted to serve.

Referring to the drawings, Figure 1 shows in longitudinal vertical section the apparatus which I prefer to use in applying my first or spirally-wound covering of paper strips to the metal core and cementing the same thereto as applied. Other means and other mechanism may be used for this purpose, as is used in wrapping bonnet and piano wires; but I prefer to use the devices shown in Figs. 1 and 2 for this purpose.

A is a frame-work of wood or metal raised upon a bench, and having a covering upon which is supported the reel H, of soft-metal wire, resting in bearings A′ A′.

The wire which I use in preference for my crimpers is a soft flat iron wire thoroughly annealed, like bonnet-wire, having a width of from one-eighth to three-sixteenths of an inch and a thickness of from one-seventieth to one one-hundredth of an inch. It may be cut into strips from a sheet or be rolled flat from a round wire, which latter is what I prefer to use. Other metals—such as soft brass, copper, tinned iron, or lead—may be used instead of iron, and the thickness and width may vary according to circumstances.

Beneath the top of the frame-work A is placed a receptacle B, open at the top and provided within and near the bottom with a roller B^3, properly supported. The receptacle B is filled in whole or part with a solution of some cementing substance, and the solution which I prefer to use is made by dissolving the best dextrine, in powder, in boiling water in such proportions as will produce a fluid of the consistency of a thin sirup. To this I add a quantity of glycerine, in the proportion of a few drops to the quart, the glycerine serving to prevent the cement from cracking when the crimper is fixed and to assist in causing the paper or other wrapping to adhere to the metal strip more firmly. Above the frame-work A is mounted a vertical journal C^3, pierced in the center over the roller B^3, and to this journal is secured a flat horizontal disk C, to the upper surface of which is attached a post C′, supporting an inclined journal C^2, so that when the said disk C is rotated upon its bearing C^3 the journal C^2 will rotate in a circle around the central opening C^5.

C^4 is a bevel-gear with which engages the vertical bevel gear-wheel J, Fig. 2, supported by the horizontal shaft J′, the said shaft deriving its power from the driving-pulley J^2. A grooved pulley J^3 upon the shaft J′ communicates motion through a round belt to the feed-rolls E E′, Fig. 1, through a corresponding grooved pulley attached to one of said rolls and not shown directly. The reel G is also operated to take up the covered strip D^2, when delivered from the feed-rolls E E′, by a slipping or friction belt G′, operated from the shaft J′. While I show the feed-rolls E E′ as operated by a belt, I often prefer to use a positive feed by driven shaft and bevel-gear operated from the driving-shaft J′, and having a worm-gear at the top meshing into a spur-wheel upon the shaft of one of the feed-rolls E or E′. As this feed is in general use upon braiding-machines, I do not (to avoid confusion of parts) introduce it into the figures. It is shown so used in Fig. 3.

The operation of covering the metal strip is as follows: Soft tough unpolished paper is cut into narrow strips having a width of from one-quarter to one-half inch. This long strip is wrapped upon a spool D′, Fig. 1, like ribbon upon a block. This spool has flanged sides to keep the paper from slipping off laterally. The spool is perforated at the middle and fits over the journal C^2, having a tension produced by its own weight, an added weight, or a spring. The spool is inclined to the axis of rotation of the disk C and the strand of wire F as it passes through the same. The reel H, of soft-metal wire, being in place, the end of the wire F is carried down by hand and passed under the roller B^3, and up through the central orifice A^2 and C^5 of the disk C, and thence upward until caught between the feed-rolls E and E′, which are embossed, as shown at *e e*, Fig. 1, and are held together by spring-pressure. Motion having been communicated to the driving-pulley J^2, Fig. 2, the feed-rolls E E′ will draw the strip of wire from the reel H steadily down through the solution of cement B around the roller B^3, and thence upward to the feed-rolls and transversely across to the reel G, the latter also operated by a friction-belt, so as not to produce too great a tension, as the belt will slip so as to keep the feed up taut, but not drag the material too rapidly through the feed-rolls E E′. The end of the strip of paper D being placed in contact with the surface of the metal strip, as shown in Fig. 1, when the machinery is in motion the spool D′ will be carried rapidly around the metal strip F as the latter ascends, and the axis of the spool C^2 being properly inclined the strip of paper will be wrapped around the wire strip in a continuous spiral, the edges of the paper thus wound overlapping each other, as shown in Fig. 6. The part of the paper in contact with the metal will be securely cemented thereto, as the metal strip in its ascent is wetted by

the solution of cement; but the parts of the paper which overlie the layer of paper beneath are prevented from coming in contact thereby, so that these overlaps or plications are not cemented throughout, but are supported at their free edges by the opposite cemented edge of each fold.

Should the quantity of cementing solution carried up by the ascent of the strip be too great, a pair of scrapers or loosely-mounted stripping-rolls beneath the top of the framework B^4 will remove the excess. As the wrapped strip D^2, Fig. 1, passes between the feed-rolls E E′ it is securely compressed, so that when subsequently passed through the braiding-bath, as will be hereinafter described, the cementing solution does not penetrate between them sufficiently to prevent their moving slightly upon each other when the crimper is subsequently flexed, the glycerine added to the cementing solution also in a measure preventing the cement from drying into a hard substance which will crack before bending.

The strips of non-metallic fabric D, I prefer, as above stated, to make of suitable paper; but I sometimes use cloth, leatheret, cotton, flax, or other suitable substances having softness, bulk, and flexibility. I prefer to color them before using to correspond with the color of the braid which I afterward apply, and in this way I am enabled to use a braid with more open meshes, the wrapping beneath, compressed by the feed-rolls of the braiding-machine, thus forming a reticulated surface of a uniform color, as described and generically claimed in my former Letters Patent bearing date April 5, 1887, and numbered 360,438. I do not always use a subsequent covering of braided fabric, however, but sometimes finish my crimper with the plicated coat, as shown in Fig. 6, or with an outer covering of paint or varnish, if desired, the plications, when rolled down and embossed by the feed-rolls, forming a handsome and durable crimper, the plications giving added bulk and enabling the said crimper to be flexed as easily as though no covering were used upon the metal strip, which is not the case when strips of tough paper are laid longitudinally along the metal, these strips impairing the flexibility, and also being greatly strained and buckled when the crimper is bent, and recovering their form but imperfectly when again straightened. As the wrapping is also done transversely and diagonally, there is much less liability of the covering to strip at the ends than when simply laid along the length of the same from end to end. The reel G, having become full, is removed and a fresh one substituted. The reel G is then laid away to dry in a warm dry atmosphere, or in a current of air either natural or artificially produced. A number of these reels are thus dried at one time ready for the next operation—to wit, that of braiding.

The braiding apparatus is shown in Fig. 3. It is mounted upon a stand K^{20} K^{20} and rests upon a bench K^{21}. The rotating toothed wheels K^3, running in involved circles, carry the bobbins K^4, which braid the threads K^5 around the strand D^2, passing up from beneath. The reel G, filled with the wrapped metal strip, as above described, is hung in bearings K^{22} and the end of the strand carried down into the pan K, partially filled with a cementing solution K′. The strip D^2, having its first or spirally-wound coating, passes under the roller K^2, and thence up through the center of the braiding-machine and between the feed-rolls K^7 K^8 and on laterally to the reel K^9, upon which it is wound. The reel K^9 derives its motion from a slipping friction-belt, as hereinabove described in Fig. 1. The pan or tank of cementing solution K is fitted between dovetail guides K^{18}, attached to the bench K^{21}, and these guides have a stop K^{19}, so that the tank may be pushed in from the end and securely held by its flanged lower side engaging beneath the dovetail grooves of the guides, and it may be removed in the same manner. The shaft K^{10} drives the wheels K^3 of the braider, and by a small bevel-gear K^{11} K^{12} communicates motion to the upright shaft K^{13}, which is provided at its upper end with a worm K^{14}, gearing with the feed K^7 by the spur-wheel attached thereto. The feed will thus have a positive movement proportioned to the speed of rotation of the wheels and bobbins K^3 and K^4. As hereinabove stated, I employ this feed in preference in the mechanism shown in Fig. 1, but to avoid confusion of parts do not show it in that figure. The cementing solution K′ is similar to that used in laying on the spirally-wrapped coating in Fig. 1; but other cement may be used, if desired. The feed-rolls K^7 K^8, as also those in the other machine E E′, are roughened or corrugated (see *e e′*, Fig. 1) to more firmly seize the strand and pull it through the machines, and also emboss or figure the surfaces in an ornamental manner without squeezing out the cement, as would in some cases result from the use of smooth-faced rolls, the corrugations or indentations serving to form small pockets, so to speak, while the projecting points grasp and hold the strand passing through.

The finished crimper is shown in cross-section in Fig. 5, the metal strip D occupying the center, the wrapped spiral and plicated covering D^2 surrounding the same, with the interposed layer of cement L, and outside is the braided covering K^6, the layer of cement L′ being seen between the braided covering K^6 and the spirally-wrapped inner cover D^2.

In Fig. 7 the crimper as a whole is shown in perspective, the braided covering being clearly indicated. To produce these, the strand K^6, Fig. 3, which is reeled upon the reel K^9, finally fills the said reel, which is then removed and a fresh one substituted. The reel K^9 is laid away to dry, after which it is placed in a cutting-machine of suitable

construction and cut up into crimpers of such length as may be required. If subsequently cut up into shorter lengths, the ends will not fray or strip, as the cement holds the same continuously from end to end.

The thread I preferably use for braiding is cotton known as "No. 40 three-ply," which I spool up in double strands and use in the braider, usually an apparatus of sixteen carriers or bobbins. Other sizes may be used for both thread and machine, if desired. The thread is dyed to match the hair with which the crimper is to be used—black, brown, or blonde—as is preferably the paper or other wrapping beneath, so that the crimper may be unseen when in use. I usually braid the covering K^6 with an open mesh to save yarn or thread and to assist in rendering the crimper more flexible, the hair being held by the stiffness of the inelastic metal strip within when the ends are bent under the same. In Fig. 4 the crimper is shown partially unwrapped, so that the superposition of the spirally-wrapped and the braided coverings may be clearly seen, the threads K^5 and the paper strip D projecting from the sides of the metal strip F.

As hereinabove described, I sometimes do not apply the outer or braided covering, but finish the crimper in the form shown in Fig. 6, (in which, however, the ends are shown partially stripped to show the mode of application of the spiral and plicated covering.) In such case the spiral covering is alone used from end to end, and the plications are rolled down and suitably corrugated or embossed by the feed-rolls E E′, (shown in Fig. 1,) a suitable surface or varnishing being added, if desired. The crimper shown in Fig. 6 may have any suitable bulk in accordance with the thickness of the spiral layers, and is exceedingly flexible and durable, though it does not carry its finish as well as the one shown in Fig. 7, in which the second or outer covering of braid is employed in addition.

I vary the material which I use for my spiral wrapping, as hereinabove stated, and I make my crimpers of much larger size for special requirements when desired. I also vary the mode of application of my coverings, as I do not strictly confine myself to the precise order of operations or construction herein specifically set forth, but vary the same as would be done by any skilled mechanic familiar with the art without departing from the principles of my invention as herein described and claimed, or the uses to which it may be applied.

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

1. As an article of manufacture, a flexible hair-crimper having an inner core-strip of soft flat inelastic metal, an inner covering of fabric spirally wound in the form of a continuous flat strip upon said metal core, the free edge of each layer thereof overlapping the opposite edge of each preceding layer in a continuous spiral, and an outer covering of braided fabric, substantially as described.

2. A hair-crimper consisting of a flat soft-metal core-strip, a spirally-wound covering composed of a strip of fabric, said spiral covering cemented to said metal core-strip along one edge of each layer thereof, the opposite edge of each layer free and overlapping the cemented edge of each preceding layer of said spiral, and an outer covering of braided fabric continuously cemented to said spiral inner covering, substantially as and for the purposes described.

3. In a flexible hair-crimper, a substantially-inelastic soft-metal core-strip and a covering of a strip of fabric, said strip wound spirally and continuously around said metal core and secured thereto by a coating of cement between one edge of each layer of said spiral wrapping, the opposite edge free and overlapping the cemented edge of each preceding layer thereof, substantially as described.

4. A hair-crimper having a flexible soft-metal flat core-strip and a spirally-wound covering of fabric, each layer thereof having an overlapping margin, and an opposite margin in contact with the metal of said core-strip, cemented thereto at said point of contact therewith, and having embossed or corrugated external surfaces, substantially as described.

5. In combination with the flat substantially-inelastic soft-metal core-strip F, the spiral inner covering D and the outer braided covering K^6, the whole secured together by the double layer of cement L and L′, substantially as described.

6. In combination with the flat substantially-inelastic soft-metal core-strip F, the spiral inner covering of paper D, of a black, brown, or blonde color, wrapped upon said core-strip F in a continuous spiral and continuously cemented thereto, and an outer covering of braided fabric K^6, braided over said spiral inner covering and continuously cemented thereto, said braided covering of a brown, black, or blonde color, corresponding with the color of the inner covering D and the hair with which said crimper is to be worn, the whole having a compressed surface, substantially as described.

7. In a hair-crimper, a substantially-inelastic soft-metal core-strip and a spiral covering of paper, said covering consisting of an elongated narrow strip wrapped around said core-strip in a continuous spiral, one edge of each layer thereof overlapping the opposite edge of each preceding layer of the said spiral wrapping, said opposite edge cemented to said core-strip continuously, and said free and overlapping edges of said wrapping compressed upon said core-strip, substantially as described.

8. In combination with the soft-metal core-strip F, the spiral inner covering D of paper,

and the braided outer covering K^6 of cotton fabric, or the like, the whole cemented together continuously from end to end, whereby the same may be transversely divided into pieces of different lengths without fraying or stripping of the free ends thereof, substantially as described.

9. An improvement in the manufacture of hair-crimpers, consisting in passing a continuous length of core-strip of soft substantially-inelastic metal through a bath of cementing solution, then wrapping a strip of non-metallic fabric in a continuous spiral around said core-strip, said core-strip wet with said cementing solution, whereby said spiral wrapping is attached to said cemented core-strip at one edge thereof, and having its opposite edge free and overlapping each preceding layer at its attached margin, and subsequently compressing the diagonally-transverse layers of said spiral wrapping upon said core-strip and dividing said continuous length of crimper-stuff transversely into hair-crimpers of a suitable length, substantially as described.

10. An improved method of manufacturing hair-crimpers, consisting in passing a continuous length of core-strip of soft substantially-inelastic metal through a bath of cementing solution, then wrapping upon the same in a continuous spiral a strip of soft tough paper, cementing the same thereto by contact with the wet solution upon said core-strip, subsequently passing said spirally-wrapped core-strip through a second bath of cementing solution, and while still wet braiding thereupon an outer covering of braided fabric, afterward transversely dividing the said continuous length of finished crimper-stuff into hair-crimpers, substantially as described.

11. The improved method of manufacturing hair-crimpers, consisting in covering a continuous length of flat soft-metal substantially-inelastic core-strip with a soft tough covering composed of a strip of paper, which is wrapped around said core-strip in a continuous spiral, having diagonally-transverse joints or breaks along the layers of said spiral, and subsequently braiding over said spiral wrapping an outer covering of braided fabric secured to said wrapping continuously from end to end, and subsequently cutting the said continuous length of crimper-stuff transversely into hair-crimpers of a suitable length, substantially as described.

12. An improvement in the manufacture of hair-crimpers, consisting in covering a flat substantially-inelastic soft-metal strip with a continuous spiral wrapping of soft tough paper having diagonally-overlapped edges, and subsequently applying an outer covering of non-metallic material and securing the same thereto continuously from end to end, substantially as described.

13. In the manufacture of hair-crimpers, the method of applying a double covering to the soft-metal core-strip thereof, consisting in wrapping around said core-strip spirally a covering of non-metallic fabric by passing the same up through and from a bath of cementing solution, and while still wet therewith applying said spiral wrapping by rotating the same around said advancing core-strip, subsequently passing the said spirally-wrapped core-strip through and up from a second bath of cementing solution, and while still wet therewith applying a second covering of braided fabric by means of a braiding-machine, substantially as described.

14. In the manufacture of hair-crimpers, the method of passing a soft substantially-inelastic metal core-strip through a bath of cementing solution, thence while still wet therewith up through a rotating wrapping-machine, and applying thereto a continuous spiral wrapping of tough paper, one edge of each layer overlapping the opposite edge of each immediately-preceding layer, and securing the same to said core-strip by contact at one edge to its cemented surface, then passing said spirally-wrapped core-strip between compressing-rolls or the like, and compressing the free layers of said spiral wrapping upon said core-strip adapted to prevent ingress of cement from a subsequent immersion, then passing said spirally-wrapped and compressed strip through a second bath of cementing solution, and while the surfaces are still wet therewith braiding over it an outer covering of fabric, substantially as described.

15. As an article of manufacture, a continuous length of soft-metal wire having an inner covering composed of a strip of non-metallic fabric wound around said wire in a continuous spiral with overlapping edges and an outer covering of braided fabric, said braided covering secured to said spirally-wound covering by a cementing substance applied thereto, substantially as herein shown and described.

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