

(No Model.)

4 Sheets—Sheet 1.

L. KOSS.

MACHINE FOR MAKING ORNAMENTAL WIRE.

No. 488,941.

Patented Dec. 27, 1892.

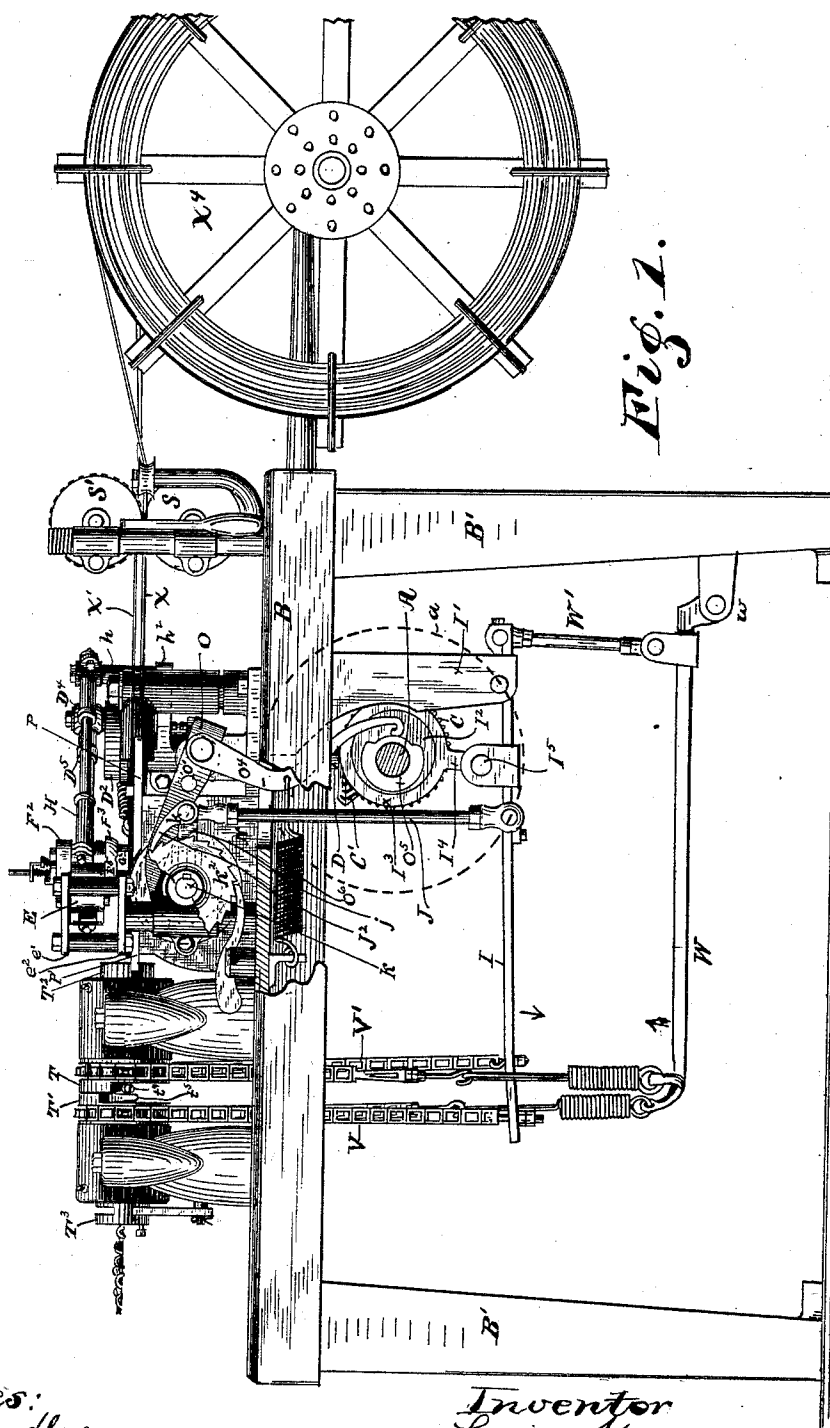


Fig. 1.

Witnesses:
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L. A. Minton.

Inventor
Louis Koss
By Joseph A. Minton,
Attorney.

(No Model.)

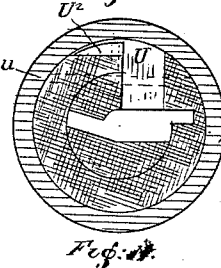
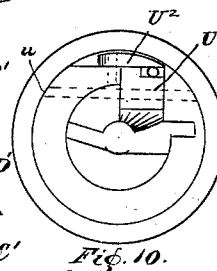
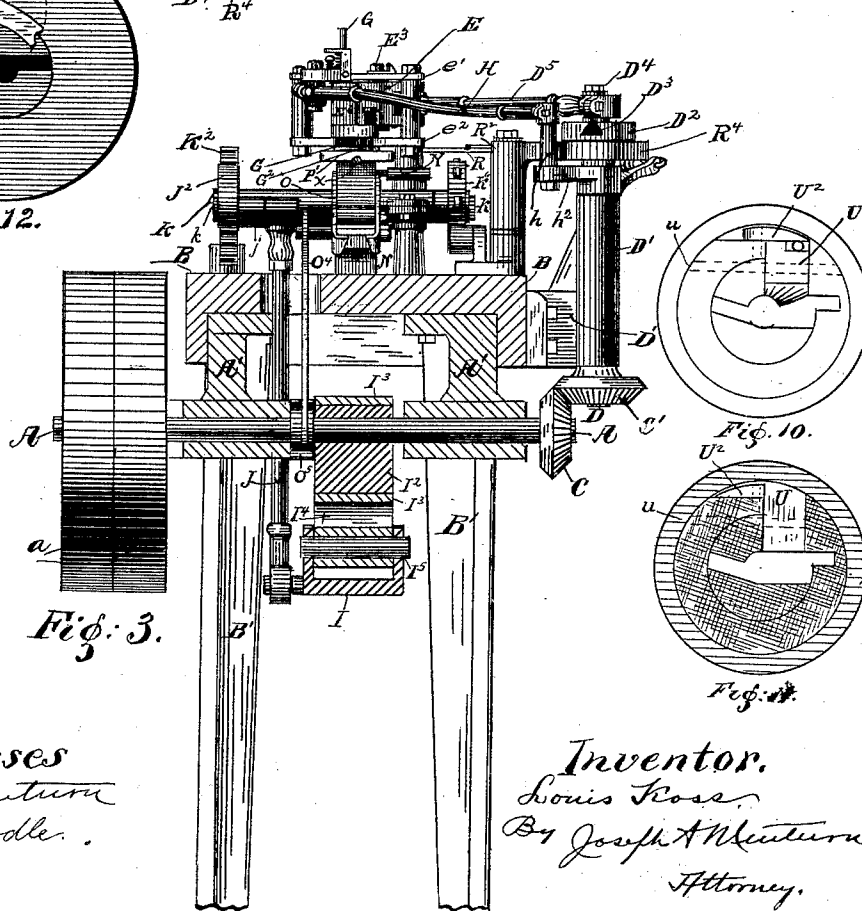
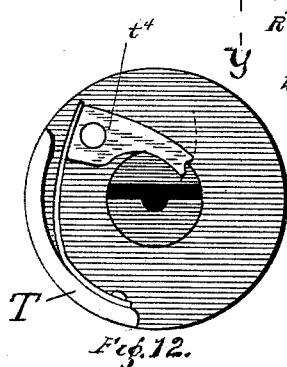
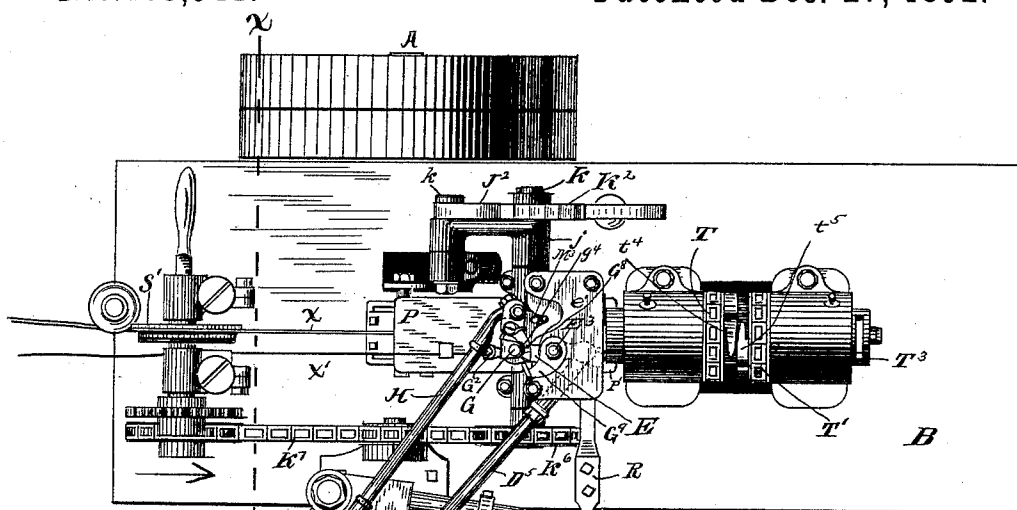
4 Sheets—Sheet 2.

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Witnesses
L. A. Minturn
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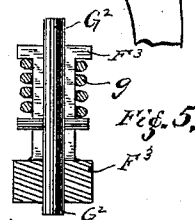
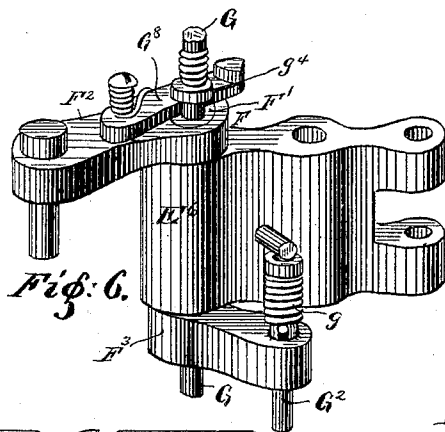
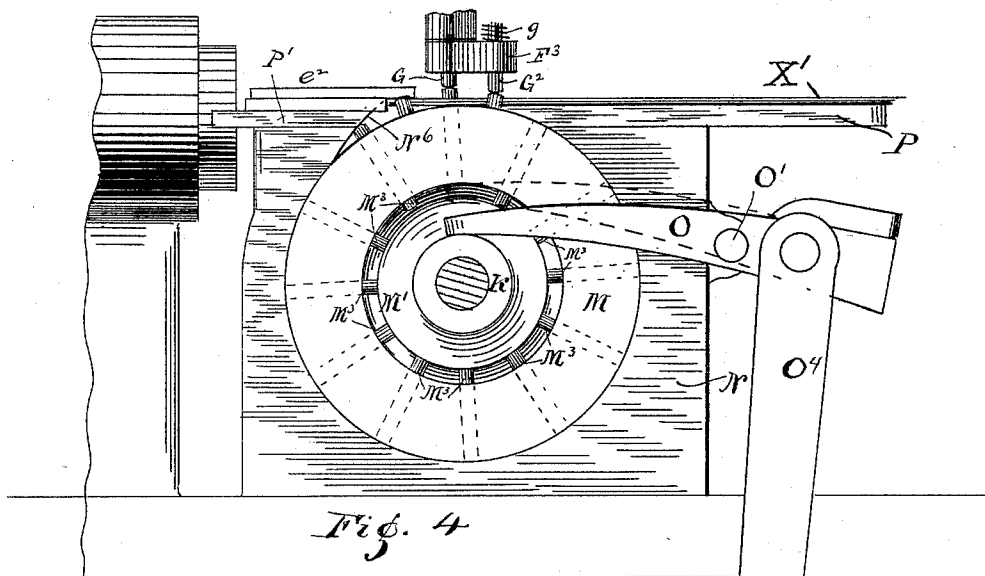
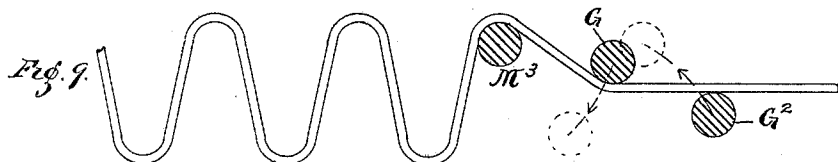
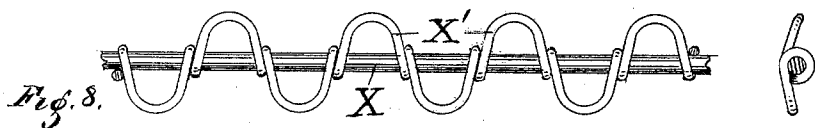
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MACHINE FOR MAKING ORNAMENTAL WIRE.

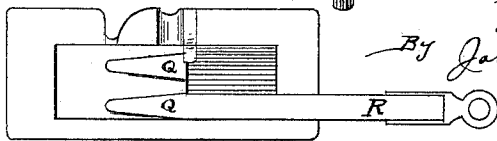
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Fig. 7.



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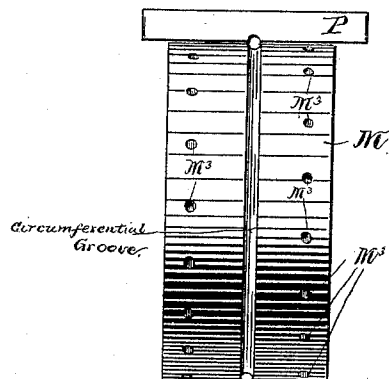


Fig. 13

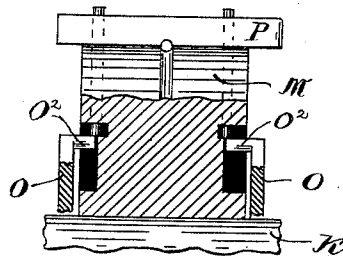


Fig. 14.

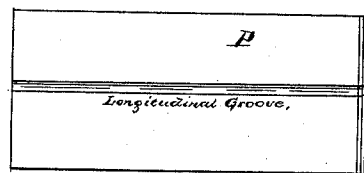


Fig. 15

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Inventor:
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UNITED STATES PATENT OFFICE.

LOUIS KOSS, OF INDIANAPOLIS, INDIANA.

MACHINE FOR MAKING ORNAMENTAL WIRE.

SPECIFICATION forming part of Letters Patent No. 488,941, dated December 27, 1892.

Application filed September 11, 1891. Serial No. 405,380. (No model.)

To all whom it may concern:

Be it known that I, LOUIS KOSS, a citizen of the United States, residing at Indianapolis, in the county of Marion and State of Indiana, have invented certain new and useful Improvements in Machines for Bending Wire; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to improvements in machines for making ornamental wire of a kind in which a single central continuous strand or wire is used with a separate wire formed into a pattern and bent around it.

The object of this invention is to provide a machine that will produce an ornamental wire fabric composed of two strands, in one continuous operation, and that will be automatic in its working and rapid. I accomplish these objects by the mechanism illustrated in the accompanying drawings in which:

Figure 1 is a view in side elevation of a machine constructed in accordance with my invention. Parts of the machine are broken away to better illustrate the construction. Fig. 2 is a top or plan view of the machine, the reel for supplying the wire not being shown. Fig. 3 is a view in vertical cross section of the machine on the line X—Y of Fig. 2, looking in the direction of the arrow. Fig. 4 is a detail in side elevation of the drum or roller having the radial pins. The figure also shows the lever by which the pins are elevated. Fig. 5 is a detail in cross section of the crank arm F³ (Fig. 6) taken on a line central with relation to the vertical pin G² and is intended to illustrate the method of securing and operating the pin. Fig. 6 is a perspective view of the head in which the pins or fingers for bending the smaller wire into a zig zag pattern are located. The double crank shaft is shown in its proper position in the head. Fig. 7 is an under side view of the slide and fingers for holding the bend in the wire after the ornamental pattern has been formed. Fig. 8 represents the complete wire as made by this machine. Fig. 9 is a diagram to illustrate the operation of bending the ornamental wire into a zig zag pattern. Figs. 10 and 11 represent the mechanism for securing an adjustable

opening for the wire through the drum T'. The opening in Fig. 10 is shown contracted, and in Fig. 11 the opening is shown enlarged. Fig. 12 illustrates the opening through the drum T for the passage of the wire and also shows the construction of the dog for engaging the loops on the wires in bending the two strands of the wire together. The same construction of dog is used on both drums. Fig. 13 is a detail showing the plate P and the face of the roller with the grooves in each for the lower wire X. Fig. 14 is a detail partially in section of the roller and arms and shows the fingers that actuate the radial pins in said roller. Fig. 15, is an under side view of the plate P and shows the longitudinal groove through which the central wire passes.

A represents the large driving shaft to which power is applied by belts connecting with the pulleys *a*; or, if preferred, a crank may be used in place of a pulley and hand power substituted.

A' are journal boxes for the shaft A and are bolted to the under side of the bed plate of the machine.

B is the bed plate of the machine and is supported upon the legs B' forming therewith the framework to which the other parts are secured.

C is a beveled gear wheel secured to the end of the shaft A and meshing with a corresponding bevel wheel C' on the lower end of the vertical shaft D, which shaft is journaled in a vertical boxing supported by the bracket D', and bolted to the side of the bed plate.

Keyed to the upper end of the shaft D is a crank wheel D², and D³ is a V-shaped groove extending centrally in a horizontal direction across the wheel D². This groove is adapted to receive a correspondingly V-shaped head on the crank pin D⁴ which may be adjusted within the groove to regulate the length of the stroke of the arm D⁵, connected to said crank pin. The opposite end of the arm D⁵ is pivotally secured to the head E. This head is pivotally secured by means of the vertical pin or bolt E³, between the plates *e'* and *e''*, the pin E³ passing through the head and being secured at each end to the plates *e'* and *e''*. On the side of the head opposite the arm D⁵ is an extension E⁶ with a vertical hole extended through it to receive the vertical shaft

F'. The shaft F' is hollow, and through its opening is projected the vertical pin G, for purposes hereinafter described. The position of the crank arms F² and F³ is approximately at right angles to each other as shown in Fig. 6.

H is an arm pivotally secured to the outer end of the arm F² and is attached at its opposite end to a stationary standard h secured by a bracket h² to the casing D'. On the outer end of the lower cranked arm F³ is a vertical pin G² having vertical adjustment controlled by the spring g on the upper extension of the pin as clearly shown in the drawings, see Fig. 6.

I, Fig. 1, is a lever pivotally secured to brackets I', bolted to the under side of the bed plate, and projected downwardly as shown, to support the lever. I² is an eccentric keyed to the shaft A, and I³ an eccentric head on the upper end of the arm I⁴. This arm is journaled at I⁵ to the lever I and forms the mechanism by which an oscillating movement is transmitted from the driving shaft A, to the lever I.

J is a connecting rod pivotally secured at its lower end to the lever I and is indirectly secured at its upper end to the horizontal shaft K by means of the intermediate crank-arm j. To the opposite end of the crank pin k, a pawl J² is secured and works in notches on a wheel K². The wheel K² is keyed to the outer end of the shaft K and a uniform intermittent movement is transmitted through the pawl and the rod J to the wheel and shaft from the lever I.

M, Fig. 4, is a roller keyed to the shaft K. It is provided with circular grooves M' on each of its sides and has a double series of holes extending radially from the face of the roller to the grooves M'. These holes instead of being directly opposite to each other in both series, are so arranged that their positions alternate, for the purposes hereinafter fully explained. Short steel pins M³ are loosely inserted in each of these holes and will slide in and out freely by their own weight. The portions of the groove M' nearest the axle, are shallower than the part on the outside, and the series of holes are so placed that the shallow portion of the groove M' will cover part of the openings of these holes and will act as stops for the pins, preventing the latter from dropping more than a certain distance down into the groove. (See Fig. 14.)

N is a casing which envelops the face of the roller with the exception of a limited portion at the top which is left exposed. The object of this casing is to keep the pins from dropping out of the holes when they are inverted by the revolution of the roller.

O is a bifurcated lever pivotally secured at O' to the casing N; one of the arms of the bifurcated lever is extended on each side of the casing and terminates opposite the center of the roller in fingers O² which are pro-

jected inwardly so as to enter the circular groove M' on each side of the roller. By raising the lever O, the fingers O² will force the pins M³ up until their ends project above the face of the roller and in so doing, come in contact with the lower ends of the pins G and G², forcing up the pins G and G² for purposes which will be more fully described hereinafter. The movement of the lever O is controlled from the main driving shaft A by means of an arm O⁴ pivotally secured to the outer end of the lever O and pressing at its lower end against a cam O⁵ keyed to the shaft A.

O⁶ is a spring, connecting the arm O⁴ with the bed plate and holds the lower end firmly against the cam and also gives a quick movement to the lever O enabling it to throw the pins out with greater force.

P and P' are horizontal plates arranged on a line tangent with the top of the roller and are secured to the casing N. A longitudinal groove between the plate P and casing is formed, and through this groove the central wire X is inserted. A circumferential groove is formed in the roller to allow the wire to pass unobstructed over the roller.

The wire X' from which the ornamental pattern is made is fed over the upper side of the plates P and P'.

The operation of bending the wire X' into a zigzag pattern (as shown in Fig. 9) preparatory to bending it upon and around the central wire X is accomplished by means of the fingers G and G² and to start the bend a hook formed by hand on the end of the wire, is caught over the pin M³ on the opposite side of the roller. In the operation of bending the wire the fingers are moved in the direction of the arrows (see Fig. 9) into the position shown by the dotted lines. The principle on which these pins operate to form the bend in the wire, is that of the application of two points of resistance upon one side of the wire and a single intermediate point on the opposite side and moving in the direction of the wire. This operation crimps or bends the wire at proper intervals and by repeating the operation a zigzag pattern is formed. As the bends are made one at a time it is necessary to hold them securely to keep the strain required to make the next bend from distorting them. As soon as a bend is made the pins M³ will be forced up by the fingers O² and will take the place of the pins G and G² raising the latter and allowing them to be moved back into their original positions for a new bend. As the successive bends are made they are thus first held by the pins M³ which are withdrawn by the revolution of the roller, and the bend will then be retained by a series of fingers Q (see Fig. 7) corresponding in shape to the bend made in the wire. The fingers are given a reciprocating movement so as to be inserted between the finished loops, and are shaped so as to fill the spaces between the loops, and will hold them from dis-

tortion while the next succeeding loops are being formed. The fingers will be withdrawn to allow the zig zag wires to move forward through the machine as the new loops are formed. The fingers and the wires operate between parallel plates which serve to prevent displacement of the wire and fingers as will be more fully described. After the wire is bent in the zig zag pattern it is passed between the plates P' and e^2 which are so adjusted that the space between them is only equal to the diameter of the wire. When the zig zag wire is between the two plates P' and e^2 and the fingers for holding the bend are thrust between two or more loops of the zig zag wire the bends will be securely held and distortion arising from the force required to make the bends will be prevented. The fingers Q for holding the bends in the wires are attached to a sliding bar R . The bar R is pivotally connected to the arm R' which in turn is pivoted at its opposite end to the standard R^2 and the standard R^2 is attached to the bed plate B . The arm R' is forced in an outward direction by the spring R^3 and is forced in again at proper intervals by a cam R^4 , on the shaft D , which bears against the arm R' as shown in Fig. 2.

K^6 , Fig. 2, is a sprocket wheel on the end of the shaft K , and by means of the sprocket chain K^7 , transmits motion to the disks S , and S' , by which the wires are force fed into the machine from suitable reels X^4 as shown in Fig. 1. As any of the well known constructions for force feeding wire may be used for this purpose, an extended description of the device as shown in the drawings is not deemed necessary. After the zig zag pattern has been formed, the next step is to bend it around the central strand. To accomplish this the wheels T , and T' , each having an oscillating movement, but in opposite directions, are employed. The axles T^2 and T^3 on which these oscillating drums are mounted, are hollowed out centrally to allow the passage of the wires X and X' through them. The openings through the axles conform to the shape of the wires; that is, the upper opening is oblong in cross section to allow free passage of the ornamental wire X' without distorting the zigzag bends in it, and the lower opening is round for the main wire X , and is midway between the ends of the upper opening to insure the proper relative position of the wires, and communicates with the upper oblong opening. The upper and lower wires are formed into one strand by bending the zig zag points of the ornamental strand first over and then under the central wire. This is accomplished by the dogs t^4 and t^5 (see Figs. 1, 2, and 12) which are pivotally secured to the adjacent faces of the drums T and T' respectively within recesses formed for that purpose on the contacting sides of the drums. These dogs are so placed that their free ends will engage the loops or points of the ornamental wire on each side of the central strand and by the oscillating move-

ment of the drums twist the points around the stationary wire. The ends of the dogs are slightly hooked to enable them the more readily to engage the points of the zig zag wire, and suitable springs are provided to press the ends into close contact with the points. (See Fig. 12.) After the first two bends are made the wires will assume a uniform position, but in making the first bend, one of the points will be on top and the other below the central wire. This fact makes it necessary to change the opening in the axle T^3 , to allow the free egress of the first bend and then to resume the original shape of the outlet. This necessitates the construction shown in Fig. 10, in which the section U is hinged on a horizontal pin, u , to allow the part U to be thrown up, thus leaving an unobstructed outlet shaped as shown in Fig. 11, which allows the first loop to pass, after which the section U is thrown down and locked by the horizontal pivoted wedge U^2 , which is thrown around on top of the section U . An oscillating movement is transmitted to the wheels T and T' , by the sprocket chains V' and V in the manner as follows:—One end of the chain V' , is attached to the lever I , and the chain passed thence upwardly and over the wheel T , and thence downwardly past the lever I , and the other end is secured to the lever W . A similar sprocket chain V passes in like manner over the drum T' , and like the chain V' , is secured, one end to the lever I and the other to the lever W , but with this difference in the arrangement, that instead of corresponding ends being fastened to the same levers, the arrangement is reversed in order to give the wheel T' a movement in the opposite direction. The lever W , is pivoted at one end to the framework of the machine and is joined to the lever I by the connecting rod W' . The connecting rod W' , is pivoted at its upper end to the lever I , and at its lower end to the lever W , but is connected with the two levers at points on opposite sides of their fulcrums in order to secure their simultaneous movement in opposite directions, and give the proper movement to the sprocket chains which turn the wheels T and T' .

After the bend is formed in the wire and the pins G and G^2 have been forced up by the lower pins M^3 , the head carrying the pins G and G^2 will swing back automatically to its first position, but to do this and also allow the newly bent wire to move forward through the machine it is necessary to retain the pin G in its raised position. This is done by extending the pin entirely through the head and forming a collar g^4 on its upper extension and providing a foot G^8 actuated by a spring that will force the foot under the collar in the position as shown in Fig. 6, when the pin G is raised and hold it up until the foot is thrown out by the stop G^9 on the plate e' . The lower pin that elevates the pin G , drops back at once into the roller, but the one that raises the pin G^2 will be needed to

assist in forming the next bend and is therefore retained in its elevated position by a stationary finger Y, (see Fig. 3) which projects into the groove and forms a stop. This pin M^3 is released by the continued revolution of the roller and by virtue of its own weight will drop back into the roller. In case pins M^3 fail to drop back into place promptly they will be forced in by contact with the gradually sloping face N^6 of the casing. The pins M^3 correspond in position with the bends in the zigzag wire, and for that reason the position of the pins in the two series instead of being on the same radial line are made to alternate.

The construction of the bifurcated lever O in which the arms are in separate pieces secured to a main body portion by bolts, is adopted in order that the arms may be adjusted independently.

I claim—

1. In a machine for making ornamental wire, an oscillating head provided with fingers for engaging the wire and bending it into a zigzag pattern, in combination with intermittently operating mechanism for disengaging the fingers from the wire after the bend is made, mechanism for actuating said oscillating head, and a slide provided with fingers, and plates for holding the bends in the wire after they have been formed by the fingers of the oscillating head, substantially as described.

2. In a machine for manufacturing ornamental wire, the combination with an oscillating head provided with fingers for engaging the wire and bending it into zigzag loops, of a slide R having fingers Q, and plates P' and e^2 for holding the bends in the wire after they have been formed by the fingers of the oscillating head: intermittently operating mechanism for disengaging the fingers of the head from the wire; the oppositely oscillating drums T and T' , through which the zigzag

ornamental strand, and the central strand are fed; dogs to engage the zigzag wire and bend it around the central strand; and mechanism for connecting and actuating said oscillating head and its fingers, substantially as described.

3. In a machine for bending wire, previously formed into a zigzag pattern, around a central strand, the oppositely rotating wheels T and T' provided with central transverse openings through which the wires are fed, and having dogs pivotally secured to the wheels and adapted to engage the zigzag wire, and by the movement of the wheels bend said wire around the central strand, in combination with connecting and actuating mechanism, substantially as described.

4. The combination with the oscillating head and its fingers, and with the oppositely rotating drums, and their spring dogs, of the levers I and W, connected by a rod W' , and sprocket connections between said levers and drums, substantially as described.

5. The combination with the oscillating head and its fingers, of a sliding bar R provided with fingers Q; a pivoted arm R' to which said sliding bar is pivotally secured, and a spring R^3 , and cam R^4 for operating said arm, and sliding bar, substantially as described.

6. The combination with the oscillating head and its fingers, of the slide R and its fingers Q; the oppositely rotating drums T and T' ; and spring dogs pivotally secured to said drums, and slightly hooked at their free ends, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

LOUIS KOSS.

Witnesses:

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