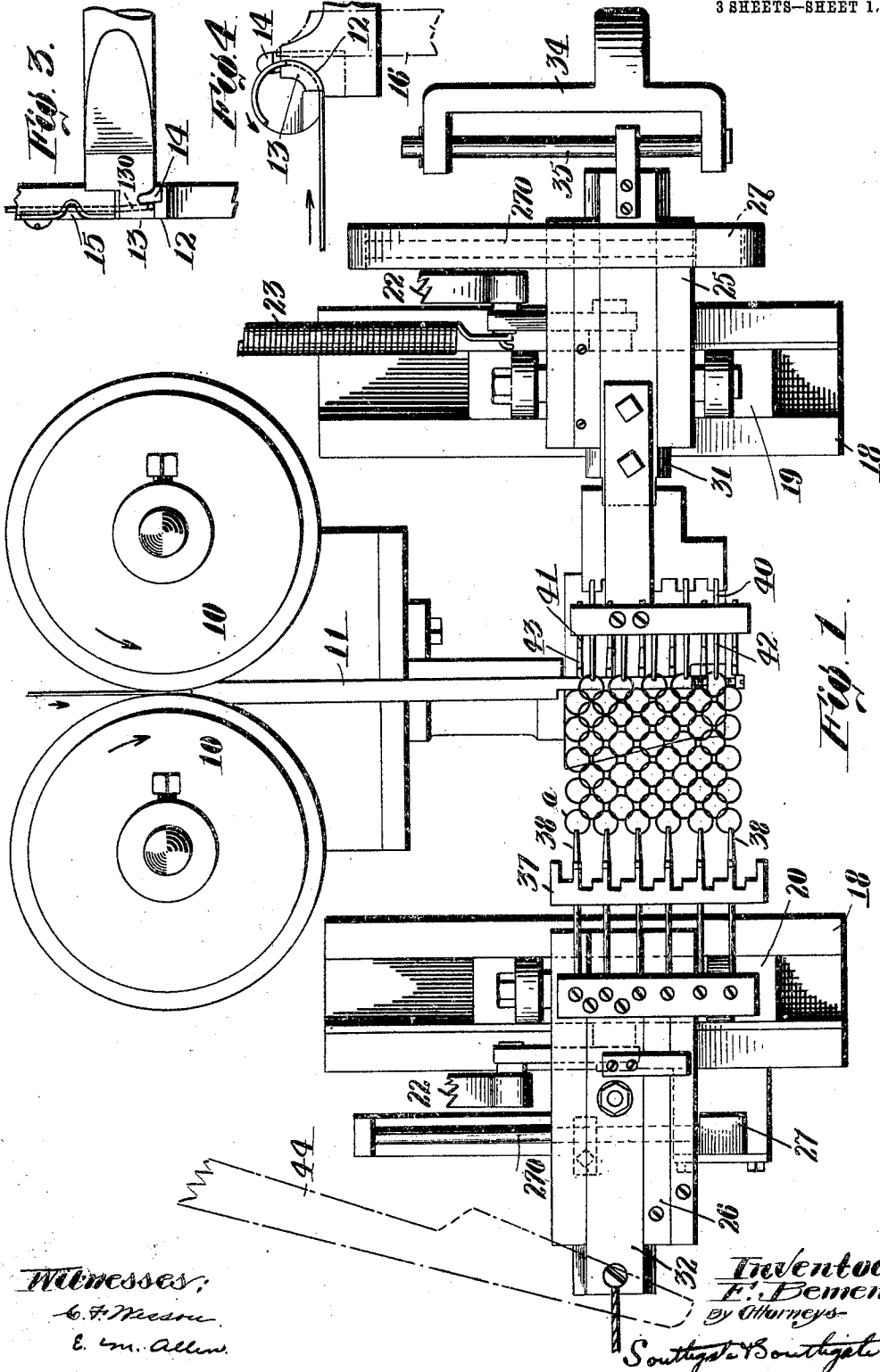


F. BEMENT.
MACHINE FOR MAKING CHAIN CLOTH.
APPLICATION FILED JUNE 29, 1908.

Patented June 7, 1910.

3 SHEETS—SHEET 1.

960,485.



Witnesses:
G. F. Mason.
E. M. Allen.

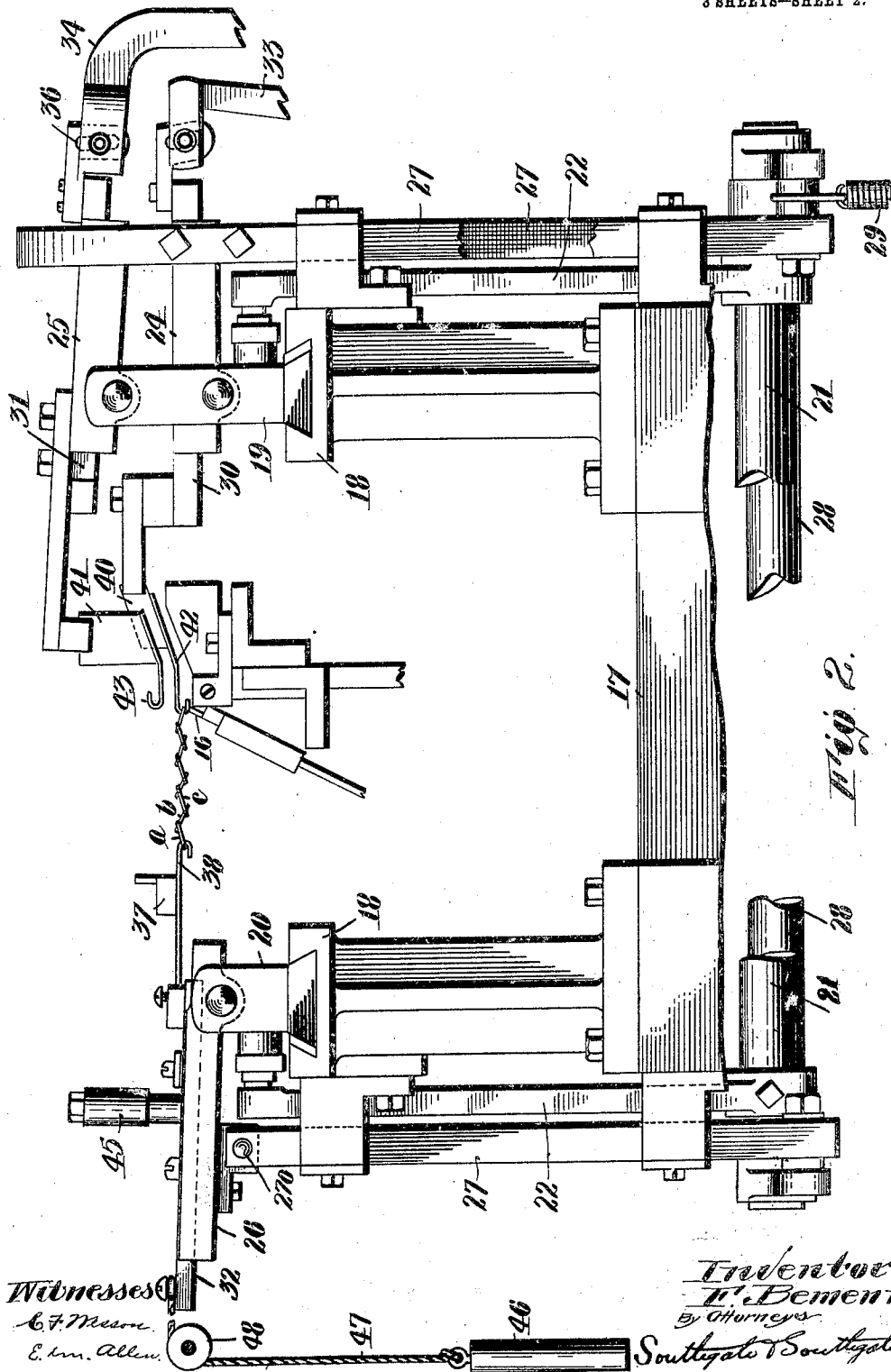
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3 SHEETS—SHEET 2.



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3 SHEETS—SHEET 3.

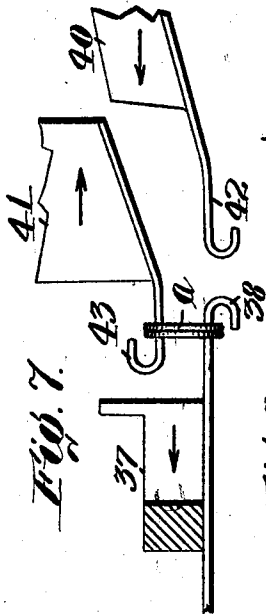


Fig. 7.



Fig. 8.

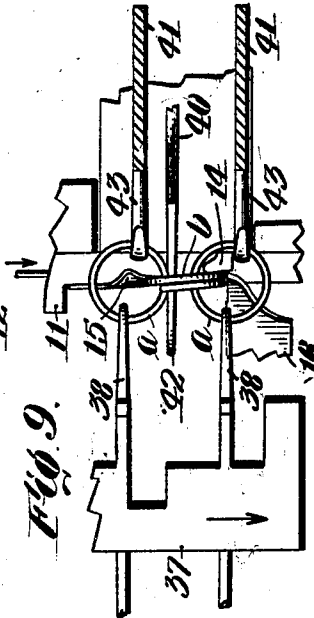


Fig. 9.

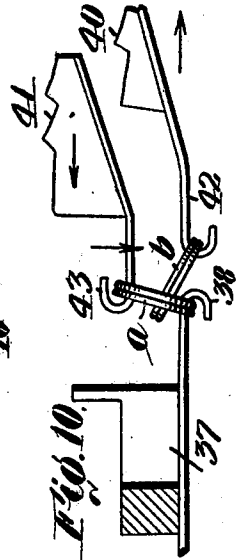


Fig. 10.

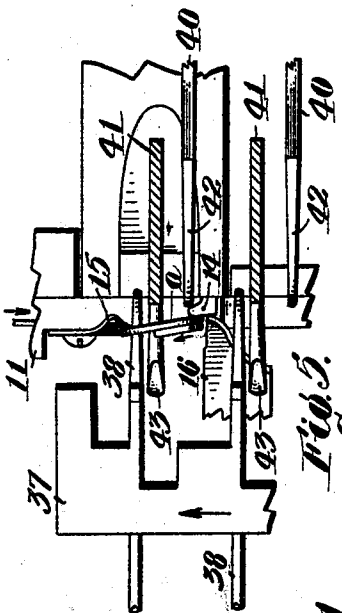


Fig. 5.

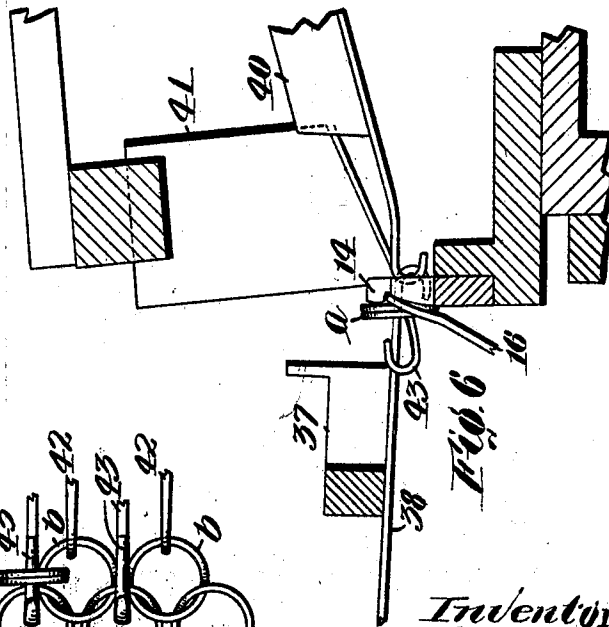


Fig. 6.

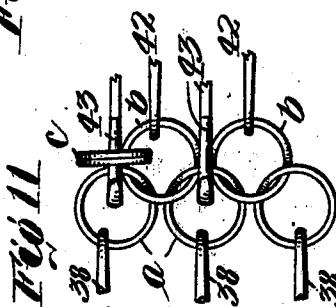


Fig. 11.

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UNITED STATES PATENT OFFICE.

FRANK BEMENT, OF SHREWSBURY, MASSACHUSETTS.

MACHINE FOR MAKING CHAIN-CLOTH.

960,485.

Specification of Letters Patent.

Patented June 7, 1910.

Application filed June 29, 1908. Serial No. 440,852.

To all whom it may concern:

Be it known that I, FRANK BEMENT, a citizen of the United States, residing at Shrewsbury, in the county of Worcester and State of Massachusetts, have invented a new and useful Machine for Making Chain-Cloth, of which the following is a specification.

This invention relates to a machine especially designed for making chain fabric which is made up of interlaced metallic circular links or rings but capable of use for making chains and fabric of other kinds.

The principal object of the invention is to provide efficient mechanism by means of which such a fabric or chain can be made in a more expeditious and practicable manner than heretofore so as to eliminate hand operations.

The invention involves mechanical means for holding the links of the fabric, and means for making the new links and interlacing them with the old ones, and for continuing to support the fabric as it is produced in the machine, the points of support at one end being shifted so as to permit the new links to be attached.

The invention also involves details of construction as will be pointed out in the claims.

Further objects and advantages of the invention will appear hereinafter.

Reference is to be had to the accompanying drawings, in which—

Figure 1 is a plan of a portion of the machine embodying this invention; Fig. 2 is a front elevation of the same; Fig. 3 is a plan of the link forming die and connective parts; Fig. 4 is an elevation of the same; Fig. 5 is a fragmentary plan on an enlarged scale showing how the links are made and supported; Fig. 6 is a longitudinal sectional view of the same; Fig. 7 is a diagrammatic view showing the way in which the links are supported when they are in position shown in Figs. 5 and 6; Fig. 8 is a similar view showing the next position; Fig. 9 is a plan partly in section showing the next step; Fig. 10 is a view similar to Fig. 8 showing the parts in the position next to that shown in Fig. 9; and Fig. 11 is a diagrammatic view showing how the third row of links are applied.

This invention is designed for making chain fabrics, such for example as are ordi-

narily used as wire dish cloths or pot chains, in which each link of the fabric consists of more than one convolution of wire and the links are intermeshed with each other so that a fabric will be produced capable of standing very hard usage.

In accordance with the present invention a single length of wire is fed between the feed rolls 10 along a guide 11 to a die which consists of a curved back die 12 and a bending member or pin 13 curved to the same shape and located in contact with the curved surface of the back die. The wire is fed by the rolls into a helical groove 130 in one of the die members, as the pin 13, and is pushed forward so as to receive a bend at this point, and to continue in the form of a circle. On account of the slight slant of the groove 130 the link or ring *a* being formed will tend to emerge in the form of a coil extending along the bending die member or pin 13. This is overcome and the coil left on the other side of the wire by means of a guard 14 extending into contact with the wire as it comes out of the groove so as to bring it over to the other side of the entering wire contrary to the natural tendency produced by the left handed helical groove 130, so that a resilient close coil may be formed. This guard is so located that the advancing end of the wire will come down by the outer side of the incoming wire and continue to coil up adjacent to it. The guide 11 is provided with a shield 15 for keeping the wire in proper position and guiding it from the die. This shield is curved over and receives the wire as it follows around from the guard. A cutting knife 16 is employed and is so connected up and operated that it cuts off the wire after it passes through the die in a periodical manner so that each circular link shall have the same number of convolutions or parts of convolutions.

The invention as shown herein comprises means for making a fabric in which each link is formed of a little less than two complete convolutions, but it will be understood that the cutting mechanism may be caused to operate in any periodical time so as to produce any other number of convolutions on each link or ring. The mechanism for operating the cutter is not herein illustrated as that is well understood in this art and does not form a part of this invention.

The way in which the wire is fed forward

and turned in the die to form the circular chain links or rings having been described, I will now proceed to describe the construction of the machine illustrated in the drawings for supporting and manipulating the fabric as it is formed so as to bring the proper links thereof into position for intermeshing therewith each new link as it is formed, and for holding the fabric taut and in proper position during the entire operation of the machine.

The machine is shown as comprising a bed 17 on which is mounted a pair of elevated tracks or ways 18 which support a pair of carriages 19 and 20. Both of these carriages are shown as intermittently moved forward and back by means of a rock shaft 21 connected with the carriages by a pair of cranks 22. The rock shaft may be operated intermittently in any desired way as by a cam (not shown) for example. A spring 23 is shown for pulling the rock shaft back in opposition to the cam. Each of these carriages is provided with a support numbered respectively 24, 25 and 26. The supports 24 and 25 are located on the carriage 19 and pivoted thereto on axes parallel with the direction of motion of the carriage so as to permit them to have a swinging motion. This motion is caused by the reciprocation of three slides 27 which are moved by a rock shaft 28 operated in any desired way, as for example a spring 29 and cam (not shown). These slides 27 have rods 270 on which the supports are loosely pivoted to permit them to operate in all positions of the supports. On each of the supports is a slide, these slides being numbered 30, 31 and 32 respectively. The slides 30 and 31 and the supports 24 and 25 are operated by means of cams, not shown, or the like, through arms 33 and 34 to have a certain sequence of operation as will be described hereinafter.

The way in which the arms 33 and 34 are connected with the slides 30 and 31 is indicated in Fig. 1, in which the arm 34 is shown. This is provided with a rod 35 like the rods 270 passing through a slot 36 in the slide. The arm does not move transversely of the frame, but swings so as to give the slide the proper motion in all positions thereof as the carriage moves back and forth on the frame. The slide 32 is provided with a bar or comb 37 thereon having a series of hooks 38 which constitute means engaging the first links of the fabric chain or chain cloth. The two slides 30 and 31 are also provided with bars or combs 40 and 41 which carry lower hooks 42 and upper hooks 43 respectively.

At the commencement of the operation of making the fabric, the hooks 38 are brought up to the hooks 43 and to the wire bending device and the first row of rings or links are

made directly on the two sets of hooks. The comb 37 and hooks 38 are moved up to this position by an arm 44 which is operated in any desired manner, preferably by means of a cam (not shown), to engage a roll 45 on the slide and push the slide up into the position shown in Figs. 5, 6 and 7, in which case the hooks 38 and 43 overlap so that each ring can be made over one of each as is indicated in these figures.

The next operation of the machine is to withdraw the arm 44, and let a weight 46 hung on a cord or chain 47 and passing over a pulley 48 pull the comb 37 back to keep the fabric taut. Then the hooks 43 are drawn back as indicated by the arrow in Fig. 7 to the position shown in Fig. 8. Simultaneously the hooks 42 are moved forward by the arm 33 and the hooks 43 moved downward by the slide 27 so that the parts will be brought into the position shown in Figs. 8 and 9, and then as the carriages travel across intermittently the second series of rings *b* will be formed, each one over two of the series *a*, and over one of the hooks 42, so that the second series of rings will be formed in position to be engaged by the hooks 42 when the latter are drawn back, which is the next operation of the device. Now the hooks 42 go back in the direction of the arrow in Fig. 10, the hooks 43 are again brought up, and then down to disengage them from the links or rings *a* and leave the two sets of links supported by the hooks 38 and 42. This is a position similar to that shown in Fig. 2, except that in that case the fabric is shown with an additional number of links. The next row of links *c* will then be formed as indicated in Fig. 11 to intermesh with one or two of the links *b* and engage the hooks 43 which are left pushed forward after being disengaged from the links *a*. When this row of links is formed all the way across the fabric, the above mentioned motions are repeated so as to pull the hooks 43 forward, bring the links *c* out into position parallel with the links *a* in Fig. 8, and then bring the hooks 42 forward and up so as to disengage them from the links *b*. They are left however sufficiently forward to permit the next set of links to be formed upon them in the same way as the links *b*. After this is done, the hooks 43 are withdrawn as above, and the process repeated. It will be seen that all this time the fabric is held on the right hand side, either by the hooks 42 or by the hooks 43; and in both cases the fabric is held on the other side by the hooks 38 which are constantly under the tension of the weight 46 so as to keep the fabric taut. At each operation also the left hand slide 27 moves with the right hand slide so as to keep the two ends of the fabric level when the links are

being formed. Ordinarily in making dish cloths from link fabrics of this kind, they are made straight across for the major portion of their width, but are given a V-shape at the end. This is accomplished in the present machine by allowing all motions to be gone through with clear to the apex of the V, and automatically throwing out the wire-feeding and link-forming mechanism at the ends by means of an index wheel or the like (not shown) so as to reduce the number of links formed in each row until the last one, in which only one is formed in the middle. When the fabric is completed it is left supported by the hooks 38 and 42 which point down. After the last link or links are completed the cam operates the arm 44 forward to move the hooks 38 up to the hooks 42 which causes the fabric to sag down in the middle and drop off the hooks. Thus the entire operation of the machine including the removal of the fabric is automatic.

For the sake of avoiding prolixity of specification and indistinctness in the drawings, I have omitted the illustration of the particular cams and index wheel which have been employed for bringing about the above mentioned motions of the parts. They can be designed by any skilled mechanic, as any other means may be devised for moving these parts in the desired way.

While I have illustrated and described a preferred embodiment of the invention, I am aware that the same may be carried out in many other forms and with many modifications without departing from the scope of the invention as expressed in the claims. Therefore I do not wish to be limited to all the details of construction shown and described, but

What I do claim is:—

1. A machine of the character described comprising a frame or bed, means for forming circular wire links, and a movably mounted bar supported by the frame or bed, hooks thereon, a second bar movably mounted on said frame and spaced from the first bar, and hooks on the second bar extending toward the hooks on the first for receiving the links.

2. A machine of the character described comprising means for forming closed circular wire links, a pair of oppositely disposed bars, hooks on each bar extending toward the other for receiving the links, and means for constantly pulling one of said bars from the other.

3. In a machine for manufacturing chain cloth, the combination with means for making series of separate closed links, of a pair of bars, hooks on said bars for carrying the chain cloth as it is made, and a tension device for constantly pulling one of said bars from the other as the chain cloth

is made and held between the two sets of hooks.

4. In a machine of the character described, the combination with means for making series of separate closed links, of a set of tension hooks for receiving the links, means for keeping said hooks under tension, and two sets of hooks located opposite the tension hooks and adapted to engage the fabric alternately.

5. In a machine of the character described, the combination with means for making series of separate closed links, of a set of hooks adapted to engage one edge of the product, and two sets of hooks adapted to engage alternately the other edge of the product.

6. In a machine for making chain cloth, the combination with means for making series of separate closed links, of a set of hooks for engaging the fabric, means opposite said hooks for receiving the links as they are manufactured, means for moving the hooks toward said first-named means when the fabric is commenced, and means for thereafter keeping said hooks under tension to keep the fabric taut.

7. In a machine of the character described, the combination with means for making series of separate closed links, of movable means for supporting the first formed edge of the fabric, movable means for supporting the other edge of the fabric, and means for moving the first-named means toward the second means.

8. In a machine of the character described, the combination with means for making series of separate closed links, of movable means for supporting the first formed edge of the fabric, movable means for supporting the other edge of the fabric, and means for thereafter keeping the first named means under tension to keep the fabric taut.

9. In a machine for making chain cloth, the combination with means for making series of separate closed links, of means for supporting the first formed edge of the fabric, means for engaging the first set of links thereof, and means for thereafter engaging the second set or row of links and holding the fabric thereby.

10. In a machine for making chain cloth, the combination of means for holding the first formed side of the fabric, a series of upper hooks and a series of lower hooks, said upper and lower hooks being movable toward and from said means, and means adapted to engage said upper and lower hooks with alternate series or rows of links of the fabric.

11. In a machine for making chain cloth, the combination of means for holding the first formed side of the fabric, a series of upper hooks and a series of lower hooks,

said upper and lower hooks being movable toward and from said means and being adapted to engage alternate series or rows of links of the fabric, the upper hooks having their hook ends uppermost, and the lower hooks having their hook ends extending downwardly.

12. In a machine for making chain cloth, the combination of means for holding the first formed side of the fabric, a series of upper hooks and a series of lower hooks, said upper and lower hooks being movable toward and from said means, and being adapted to engage alternate series or rows of links of the fabric, and means for moving both of said sets of hooks forward and back so as alternately to engage a series of links and release them.

13. In a machine for making chain cloth, the combination of means for forming ring links, a plurality of sets of hooks for supporting the chain cloth, and means for moving all the hooks together up and then down between the ring making operations to take a ring from the ring-forming means and put the hooks in position to receive the next ring link.

14. In a machine of the character described, the combination of means for engaging the edge of the fabric, means for moving said means longitudinally and then transversely in a predetermined path, and means for forming circular closed chain links on the first named means.

15. In a machine of the character described, the combination of a frame, transverse guides supported thereby, a carriage movable along the guides, a slide mounted to reciprocate on the carriage, means on the slide for supporting the edge of the fabric while being formed, and means for moving the slide in a predetermined path.

16. In a machine of the character described, the combination of a frame, a transverse guide thereon, a carriage movable along said guide, a slide mounted to reciprocate on the carriage at right angles to the direction of motion of the carriage, hooks on the slide for engaging the edge of the fabric, and means for moving the slide in a predetermined path.

17. In a machine of the character described, the combination of a frame, a transverse guide supported thereby, a carriage movable along the guide, a slide mounted to reciprocate on the carriage, means on the slide for supporting the edge of the fabric while being formed, and a tilting support on the carriage on which the slide is mounted.

18. In a machine of the character described, the combination of a frame, transverse guides supported thereby, a carriage movable along the guide, a slide mounted to

reciprocate on the carriage, means on the slide for supporting the edge of the fabric while being formed, a tilting support on the carriage on which the slide is mounted, and means for swinging said support.

19. In a machine of the character described, the combination of a frame, a carriage movable transversely thereon, two supports pivoted on said carriage on axes located parallel with the direction of motion of the carriage, a slide mounted on each of said supports, and fabric engaging means carried by both of said slides.

20. In a machine of the character described, the combination of a frame, a carriage movable transversely thereon, two supports pivoted on said carriage on axes located parallel with the direction of motion of the carriage, a slide mounted on each of said supports, fabric engaging means carried by both of said slides, and means for alternately moving each fabric engaging means in position to engage the fabric.

21. In a machine of the character described, the combination of a plurality of swinging supports, a slide mounted on each of said supports, fabric engaging means carried by said slides, and means for manipulating the slides and supports to alternately engage said fabric engaging means with the fabric.

22. In a machine of the character described, the combination of a plurality of swinging supports, a slide mounted on each of said supports, fabric engaging means carried by said slide, means for manipulating the slides and supports to alternately engage said fabric engaging means with the fabric, and means opposite said fabric engaging means for holding the opposite side of the fabric and keeping it under tension.

23. In a machine for making chain cloth, the combination of two independently movable sets of hooks for holding one edge of the fabric, means for moving said sets of hooks vertically, longitudinally and transversely in different predetermined paths, and means for forming closed independent chain links on the hooks.

24. In a machine for making chain cloth, the combination with means for holding one side of the fabric, with means for keeping said means constantly under tension, means for holding the other side of the fabric, and means for moving the last named means up and down.

25. In a machine for making chain cloth, the combination with means for holding one side of the fabric, with means for keeping said means constantly under tension, means for holding the other side of the fabric, and means for making ring links and simultaneously passing them through the last named side of the fabric.

26. In a machine of the character described, the combination with means for holding the rings on one side of the fabric constantly under tension, means for engaging the rings on the other side of the fabric, and means for making rings adjacent to the last named side and simultaneously passing them through the rings thereof so as to interlace them with the fabric.

27. In a machine of the character described, the combination of means for holding the edge of the fabric, means located adjacent thereto for feeding the wire and curling it up to form a series of separate closed rings, and means for cutting off the wire.

28. In a machine of the character described, the combination with means for forming series of separate closed ring links, of means for holding ring-links previously formed, means for feeding the wire to said links, and means for simultaneously bending said wire and passing it through a plurality of previously formed links.

29. In a machine of the character described, the combination of a wire feeding device, a movable holding device for the previously formed fabric adapted to successively move the links of fabric, and a set of dies for bending said wire to form series of separate ring links and simultaneously pass them through the previously formed links.

30. In a machine of the character described, the combination of a wire feeding device, a movable holding device for the previously formed fabric adapted to successively move the links of fabric, a set of dies for bending said wire to form series of separate ring links and simultaneously pass them through the previously formed links, and means for intermittently moving the fabric holder into position adjacent to the dies.

31. In a machine of the class described, the combination of feed-rolls for feeding a wire forward, a guide for the wire, a back die having a concave surface, a pin die having a circumferential groove adjacent to said surface, and a guard located adjacent to said groove.

32. In a machine of the class described, the combination of feed-rolls for feeding a wire forward, a guide for the wire, a back die having a concave surface, a pin die having a circumferential groove adjacent to said surface, and a guard located adjacent to said groove and mounted on the back die for directing the wire after it passes through the dies.

33. The combination of a guide for wire, a shield thereon, a set of dies for bending

the wire to form chain links, a guard engaging the wire as it emerges from said guard and directing it into contact with said shield.

34. In a machine for forming chain cloth, the combination of means for supporting a plurality of independently movable closed chain links, and means for automatically forming new independently movable circular chain links interlocked with the previously formed links and separate from each other.

35. In a machine for forming chain cloth, the combination of means for supporting a plurality of independently movable chain links, and means for separately forming a plurality of new independently movable closed chain links, interlocked with the previously formed links, and removing the same from the supporting means.

36. In a machine of the character described, the combination with a plurality of sets of hooks, of means for successively coiling wire around said hooks and through certain of the previously formed links to form a fabric.

37. In a machine of the character described, the combination with a hook adapted to engage a chain link for supporting one side of the fabric, with means for coiling wire around said hook to form a link.

38. In a machine of the character described, the combination with means for coiling wire to form successive links, of link supporting hooks, and means for moving said hooks into a position to project one of said hooks through a link while it is being coiled.

39. In a machine of the character described, the combination of a die for coiling wire having a helical circumferential groove therein, and means adjacent to the die for turning the wire as it emerges therefrom in a direction opposite to that in which it is started by said groove.

40. The combination with a wire bending die having a slanting groove therein, of a guard located at the discharge end of said groove and on the side of the groove toward which the wire is directed by the groove, for changing the direction of the wire as it emerges to the opposite side of the groove.

In testimony whereof I have hereunto set my hand, in the presence of two subscribing witnesses.

FRANK BEMENT.

Witnesses:

GILMAN E. JOFF,
EDWIN C. POTTER.