O. N. TEVANDER.

BAND MAKING MACHINE.

APPLICATION FILED JULY 31, 1911.

1,078,707.

Patented Nov. 18, 1913.

5 SHEETS—SHEET 1.

Fig. 1.

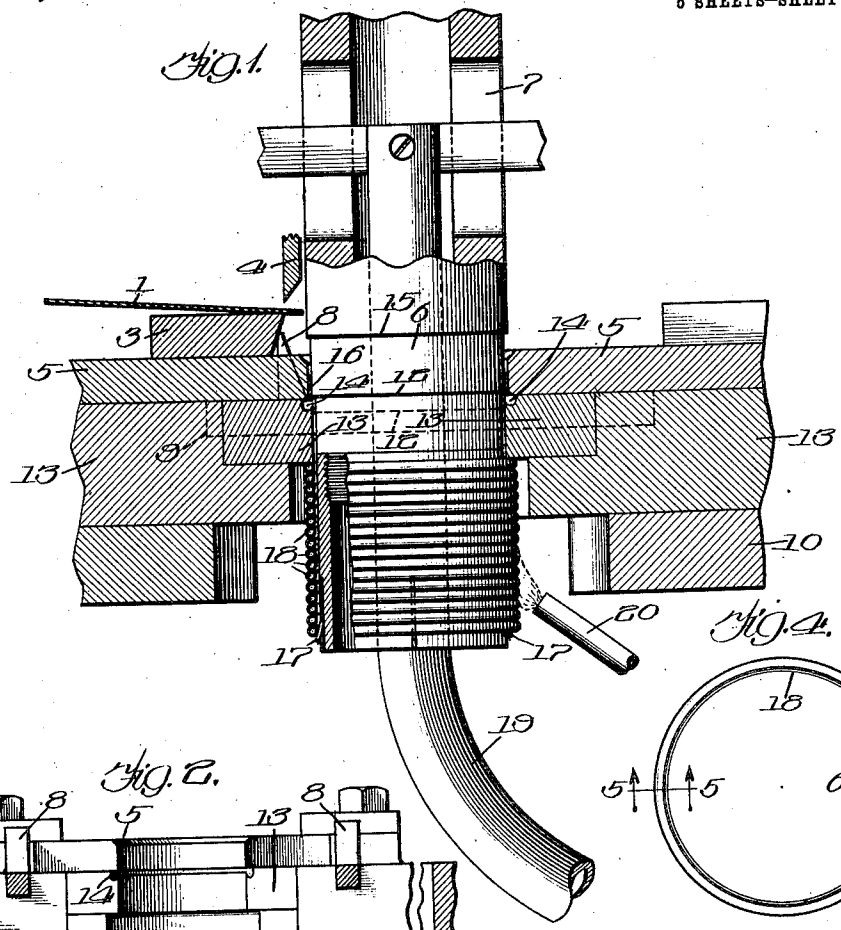



Fig. 4.




Fig. 2.

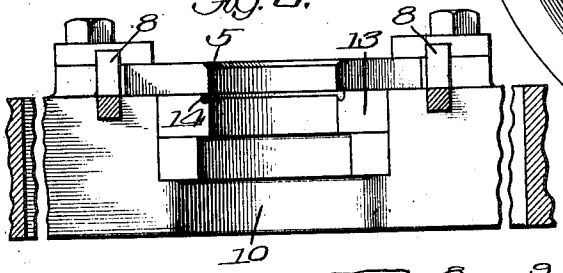



Fig. 5.

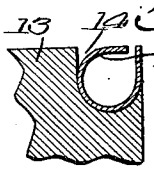



Fig. 3.

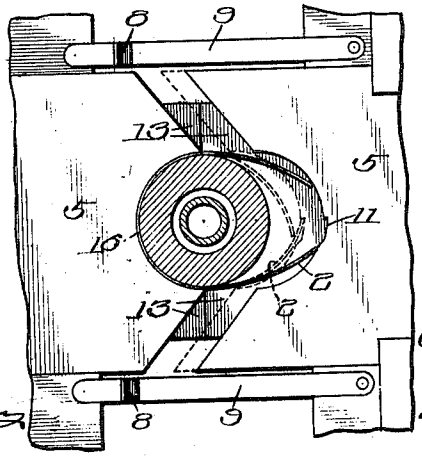



Fig. 6.




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5 SHEETS—SHEET 2.

Fig. 7.

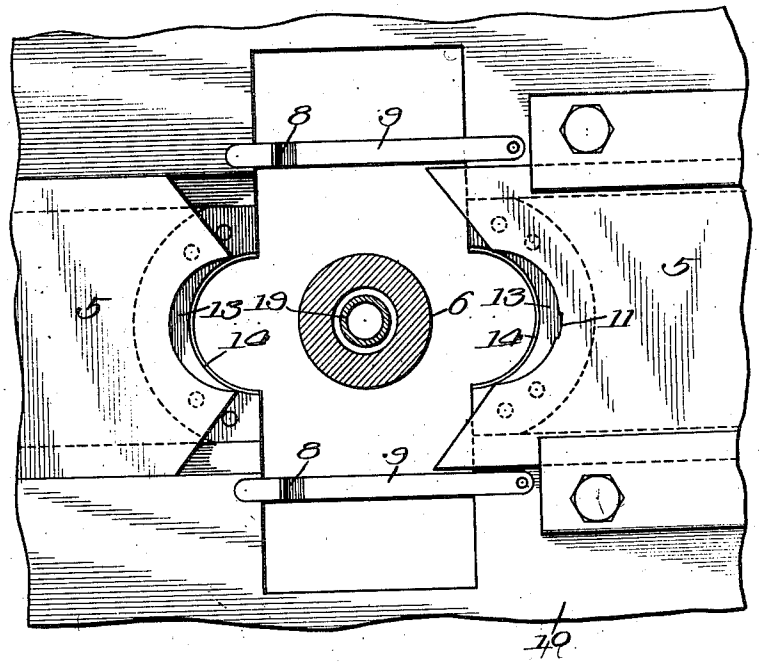
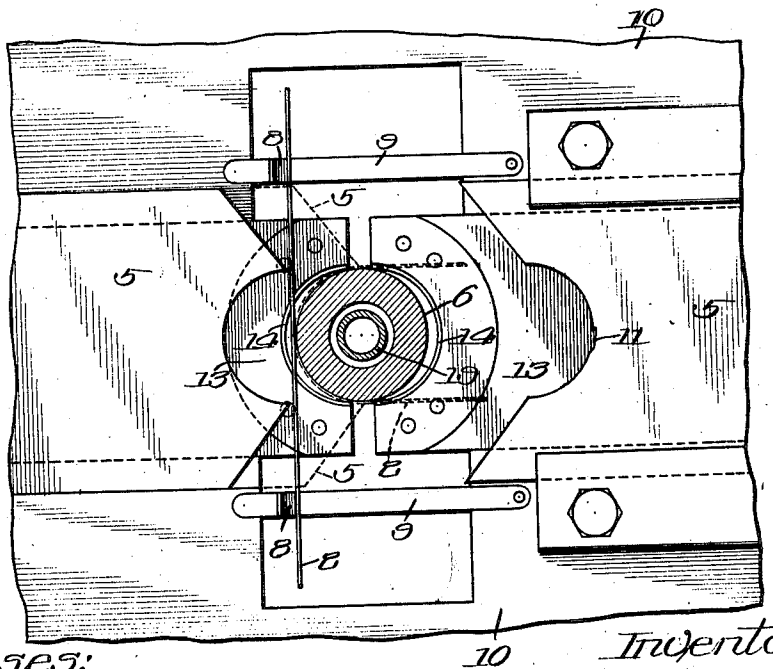



Fig. 8.




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BAND MAKING MACHINE.

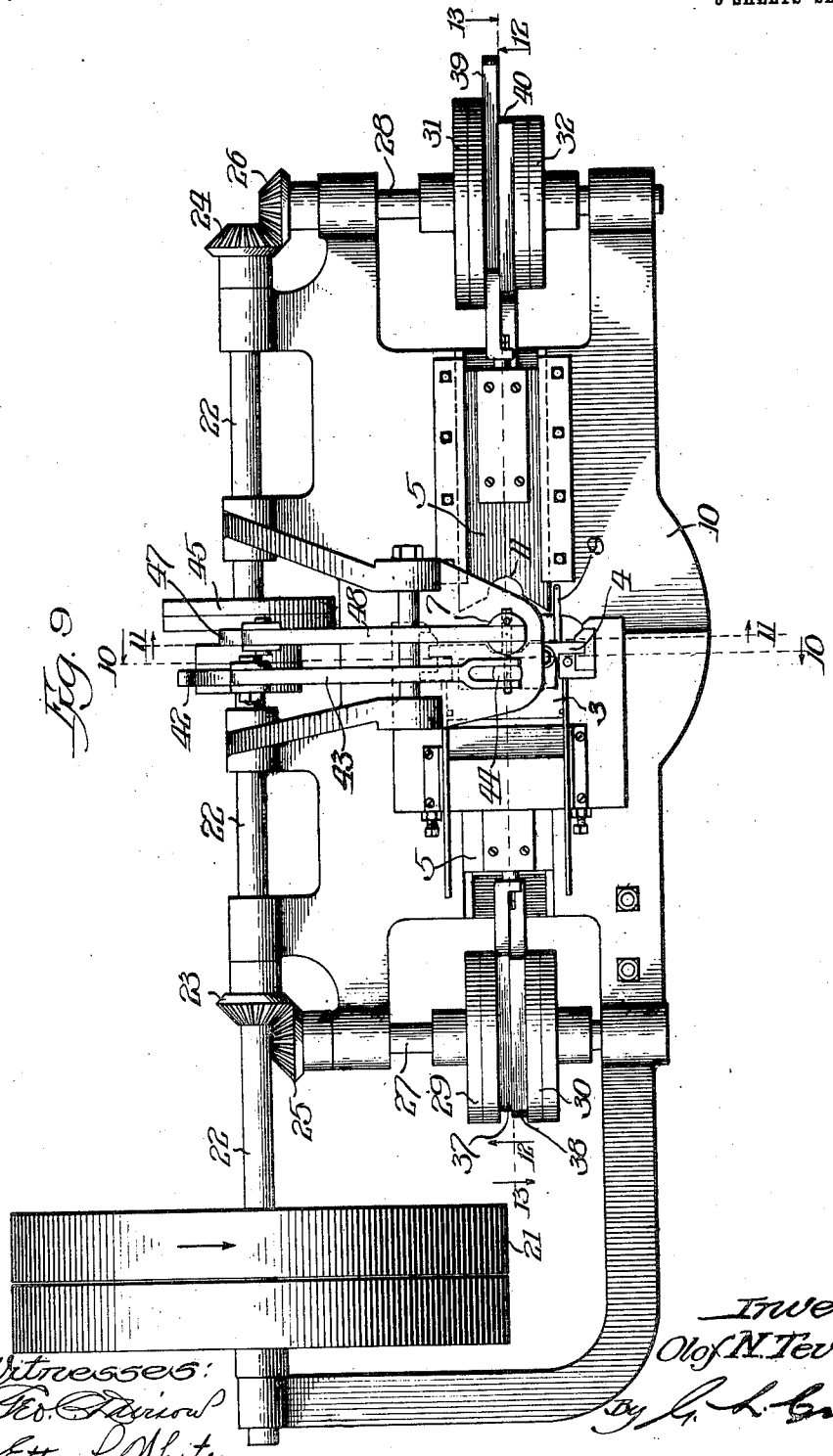
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5 SHEETS—SHEET 3.

Fig. 9




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5 SHEETS—SHEET 4.

Fig. 11

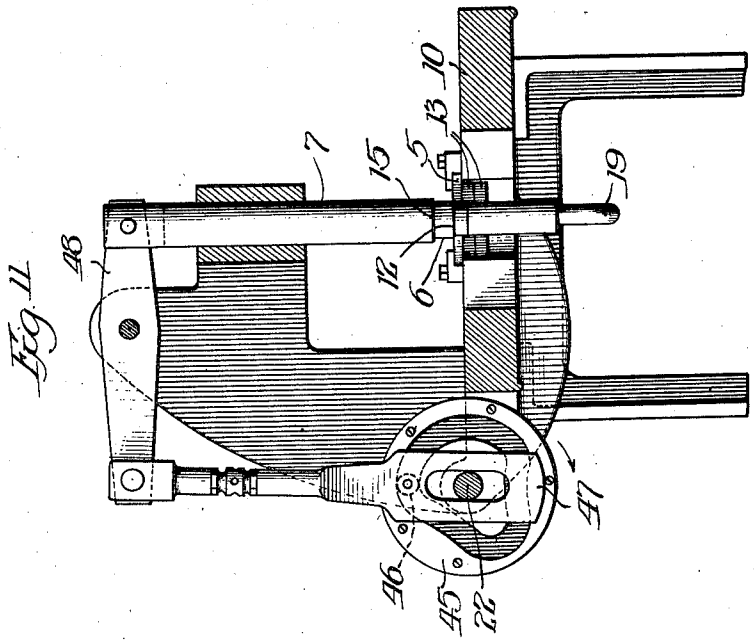
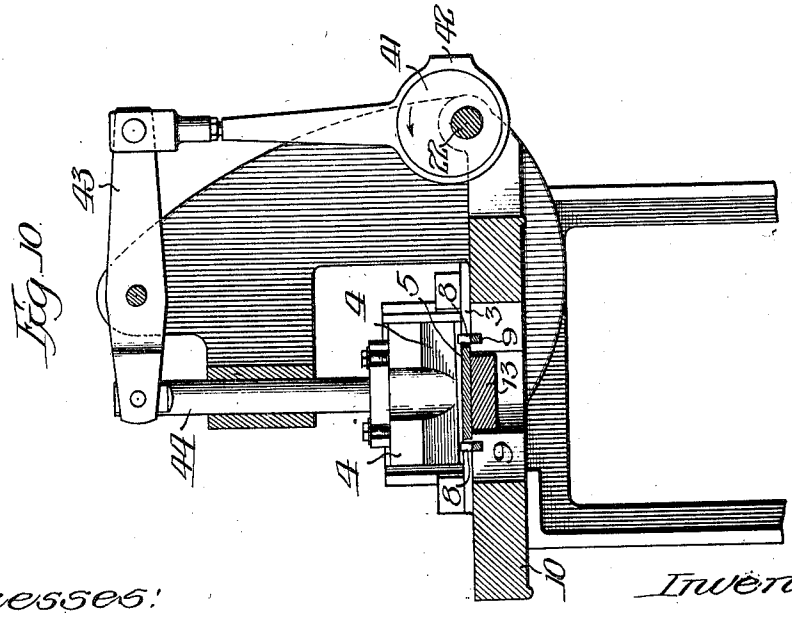



Fig. 10




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5 SHEETS—SHEET 5.

Fig. 12.

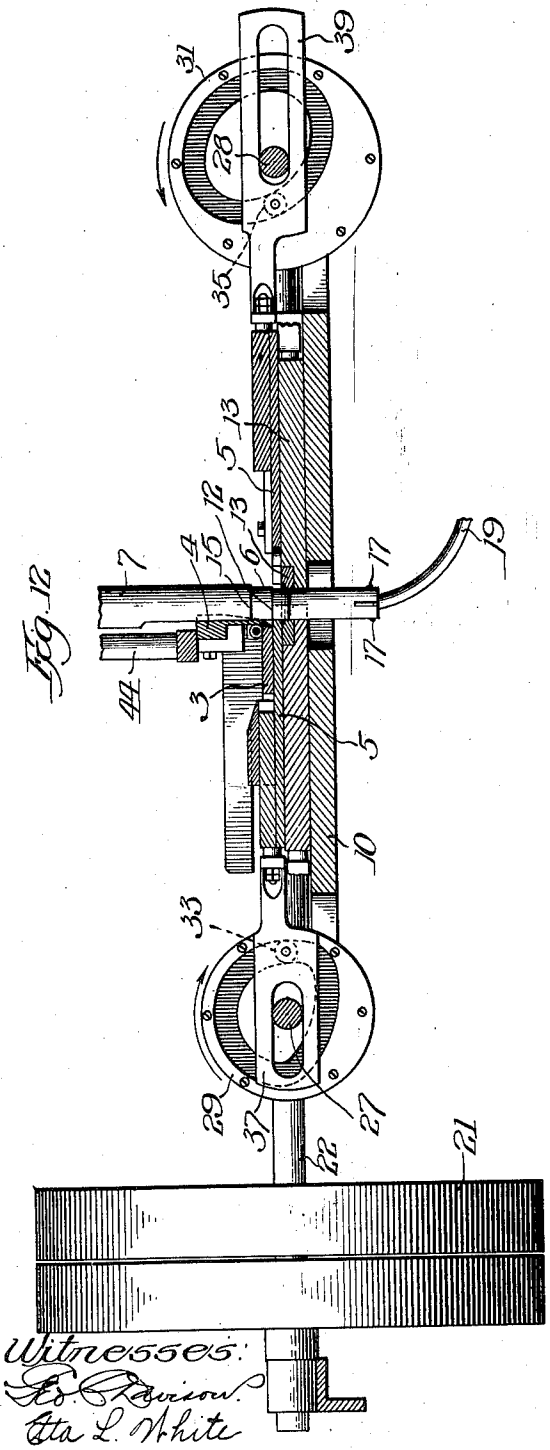
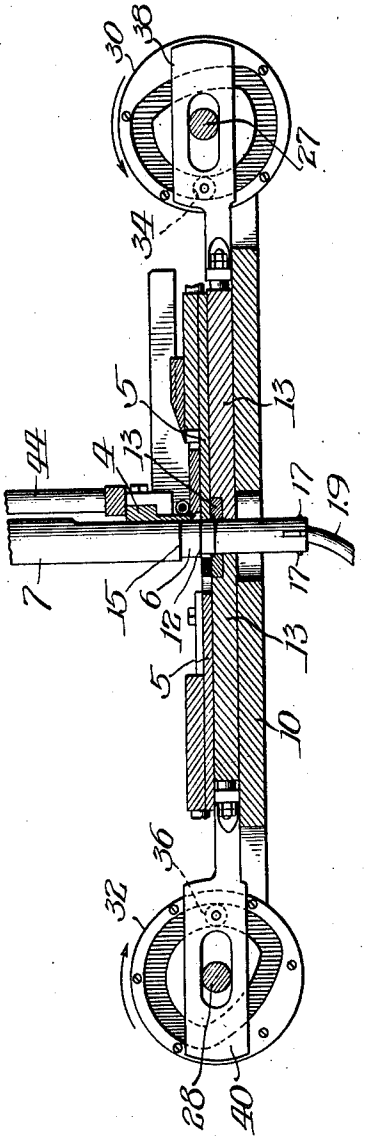



Fig. 13.




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# UNITED STATES PATENT OFFICE.

OLOF N. TEVANDER, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-HALF TO ARTHUR MANIERRE, OF CHICAGO, ILLINOIS.

## BAND-MAKING MACHINE.

1,078,707. Specification of Letters Patent. Patented Nov. 18, 1913.

Application filed July 31, 1911. Serial No. 641,648.

*To all whom it may concern:*

Be it known that I, OLOF N. TEVANDER, citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Band-Making Machines, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to machines for making bands, the product of my invention being of particular service when employed for fastening closures in position, though I do not wish to be limited to a machine that makes bands for this purpose. The bands, as they are preferably made, are formed of strip metal and are desirably made endless by having the end portions of the strip metal fastened together, as by soldering, though I do not wish to limit myself to the formation of bands that are continuous or endless, nor to the soldering together of the band ends.

My invention will be explained by reference to the accompanying drawings that show one of its embodiments, though it is to be understood that the invention is not to be limited to the precise embodiment illustrated.

The product herein disclosed forms the subject matter of a co-pending application Serial No. 566,580, filed June 13, 1910.

In the drawings Figure 1 is a sectional elevation of the essential parts of a machine constructed in accordance with one embodiment of the invention; Fig. 2 is a view through the central portion of the structure as it is shown in Fig. 1 but taken at right angles to the direction in which Fig. 1 is illustrated, some of the mechanism shown in Fig. 1 being omitted in Fig. 2; Fig. 3 is a plan view of a part of the structure, some of the parts being shown in different adjustment as compared with the adjustment illustrated in Fig. 1; Fig. 4 is a view of the preferred form of the product; Fig. 5 is a sectional view of the band shown on line 5—5 of Fig. 4, a forming jaw being also indicated in section in Fig. 5 to render more clear this structural detail of the machine; Fig. 6 is a cross sectional view of a completely formed band taken through the joined ends thereof on line 6 6 of Fig. 4; Fig. 7 is a plan view of the machine with certain of the parts in another adjustment; Fig. 8 is another plan view of the machine with certain parts shown in still another adjustment; Fig. 9 is a plan view of the complete machine; Fig. 10 is a sectional view on line 10 10 of Fig. 9; Fig. 11 is a sectional view on line 11 11 of Fig. 10; Fig. 12 is a sectional view in the direction of arrows 12 12 of Fig. 9; and Fig. 13 is a sectional view in the direction of the arrows 13 13 of Fig. 9.

Like parts are indicated by similar characters of reference throughout the different figures.

The bands that are formed by the machine are desirably circular in shape and are desirably endless, as illustrated in Fig. 4, though I do not limit myself to the shape of the bands nor to the fact that they are endless.

The machine for making the bands includes cam mechanism and operating parts. The strips from which the bands are to be formed may be supplied to the machine by a component part thereof or by separate facility. In Fig. 1 I have shown a sheet 1 from which straight strips (one being illustrated at 2 in Fig. 8) may be cut, the cutting means including a component portion of the machine comprising cutting mechanism 3 and 4, the cutter 4 being vertically reciprocated in order to cut the strips from the sheet. One set of relatively movable jaws 5 is provided, both of these jaws being desirably movable so that they may both be moved from and toward a forming body 6 that is desirably an integral part of a vertically movable cylinder 7. As the product illustrated in Figs. 4, 5 and 6 is a circular ring, the forming body 6 has an external surface which substantially conforms in peripheral length to the inner edge of the ring. When each strip 2 is being cut from the sheet 1 the jaws 5 are in positions removed from the forming body 6 as indicated in Fig. 7 so that the formed strip 2 is adapted to fall between the left hand jaw 5 and the forming body 6. The forming body 6 and the jaws 5 are designed to act upon the face portions of each strip 2 to which end such strip is guided into a substantially vertical position by means of guiding pins 8 that are carried upon struts 9 than span a gap provided in a stationary plate 10 which supports the jaws 5 and other mechanism. When a strip 2 has been cut from a sheet 1 and has fallen between the

forming body 6 and the left hand jaw 5, the left hand jaw 5 first advances toward the forming body to engage the substantially upright strip 2 to bend a portion thereof that lies substantially at the middle of the strip into a half circle conforming to the diameter of the forming body 6, whereafter the right hand jaw 5 moves toward the left hand jaw to engage the remaining portions of the strip 2 and bring them into engagement with the opposed portions of the forming body whereby the band is partially formed with dimensions that approximate the dimensions of the complete band. Where the band is to be endless, the right hand jaw 5 is provided with a notch 11 for receiving one end of the strip 2 to permit the other end to underlie and slide beneath the first end, as indicated most clearly in Fig. 3, so that the ends of the partially formed band overlap. The material of the band in this first stage of its construction is rectangular in cross section as illustrated in Fig. 1 at 16 where the jaws are shown closely approached to the forming body 6 but in which the forming body has been slightly elevated.

The forming body 6, during the time the jaws 5 are being moved toward it, has its lower edge 12 in the position indicated by the dotted line also marked 12 in Fig. 1 so that the forming body may not only serve to take part in the initial formation of the band but may also be prepared instantly to take part in curling the material of the band in cross section, the forming body coöperating with the jaws 13 for this purpose. The portion of the forming body 6 that is placed in the plane of the jaws 13 for the purpose just stated, constitutes a motion restricting member to prevent the partially formed band from being moved inward so that the jaws 13 may perform their curling function. As illustrated in several of the figures and as most clearly shown in Fig. 5, the upper opposed margins of the jaws 13 are provided with recesses 14 conforming substantially to the shape that the band is finally to have in cross section of its material. After the band has been partially formed by the jaws 5, the forming body 6 is lowered so that the shoulder 15, which is of a diameter that enables it to have sliding contact with the jaws 5 when closed, engages the top edge of the partially formed band 16 and forces it downwardly into the grooves 14, the lower edge of the band being curled outwardly and thereafter returned into close proximity to the upper edge of the band during the downward movement of the shoulder 15 to bring the band into the shape illustrated in Figs. 4, 5 and 6, the lower part of the forming body serving to prevent the contraction of the diameter of the band and so restricting the movement of the band that the curling function may be performed. The means for curling the partially formed band is desirably in the form of the jaws 13 since the jaws may be drawn back from the forming body to permit the formed ring to be discharged, the jaws 13 being desirably simultaneously moved, with equal speeds, with respect to the forming body. I do not wish to be limited, in all embodiments of my invention, to the employment of relatively movable jaws 13. When jaws 13 are employed they are desirably advanced toward the forming body simultaneously with the movement of the jaws 5 toward the forming body, so that the jaws 13 will take part in holding the strip 2 while it is being initially bent by the left hand jaw 5. During the curling operation the jaws 5 desirably remain substantially in the position to which they have been brought in partially forming the band so that the partially formed band cannot buckle when lying between the jaws 5 and is constrained to curl when pushed within the recesses 14.

When the band has been properly curled, the jaws 13 are withdrawn to afford a clear space through which the band may drop and the cylinder 7 is raised, from the position to which it has been lowered, sufficiently to enable the jaws 5, which are still closed, to scrape the newly formed band from the body portion 6 so that the band may thereafter be permitted to fall. The lower portion of the cylindrical element 7 carries a number of spring fingers 17 that are located a sufficient distance away from the forming body 6 so as to hold a number of formed bands indicated at 18. The upward movement of the cylinder 7 is not only sufficient to enable the jaws 5 to scrape the curled band from the forming body 6, but is also sufficient to cause the lowermost band 18 to escape the spring fingers 17 and fall upon the rod 19 that guides each band in its discharge from the machine. The lower portion of the cylinder 7 and the spring finger 17 carried thereby constitutes a holder for the bands temporarily to retard their discharge from the machine. A source of heat 20 is placed in juxtaposition with the overlapped ends of the bands, the overlapped ends of the different bands being vertically alined. The metal of which the bands is formed is desirably tinned, at least where the ends of the bands overlap, so that the heat applied to the overlapped ends of the bands will cause these overlapped ends to be soldered together.

I have thus provided a band making machine that includes unitary mechanism having a forming portion for bending strip material into the approximate dimensions of the band and means for curling the partially formed band to cause the material to be curled in cross section. While my invention, as preferably practised, includes such

unitary mechanism, there are characteristics of the invention which are considered to be novel *per se*.

Any suitable form of mechanism may be employed for operating the parts which I have described. I have shown, in Figs. 9 to 13 inclusive, parts which are complemental to those parts which I have hitherto described and which may be suitably employed for effecting their proper operation. A suitable source of power is employed to drive a fixed pulley such as 21, this fixed pulley being rigid upon a shaft 22 that fixedly carries beveled pinions 23, 24. These beveled pinions are in mesh with beveled pinions 25 and 26 respectively, these latter pinions being fixed upon horizontal shafts 27 and 28. Cams 29 and 30 are fixedly mounted upon shaft 27 and cams 31 and 32 are fixedly mounted upon shaft 28. The cams 29 to 32 inclusive are provided with camways that respectively receive cam rollers 33, 34, 35 and 36, these cam rollers being respectively carried upon cam slides 37, 38, 39 and 40. The cam slides 37 and 39 are connected with the opposing jaws 5 while the cam slides 38 and 40 are connected with the lower opposing jaws 13. The cams 29 to 32 are so relatively related as to operate the jaws 5 and 13 in a manner which has been described. The shaft 22 carries an eccentric 41 about which an eccentric strap 42 is passed, this eccentric strap being articulated with one end of a rocker arm 43, the other end of this rocker arm being articulated with the cutting jaw 4 by a vertically guided reciprocating rod 44, see Fig. 10. The shaft 22 also carries a cam 45 (Fig. 11), the cam groove in the cam receiving a cam roller 46 carried upon a slide 47. The cam slide 47 is connected with one end of a rocker arm 48, the other end of this rocker arm being connected with a plunger 7 which is thus operated by the mechanism shown for the purpose hitherto set forth.

While I have herein shown and particularly described the preferred embodiment of the invention I do not wish to be limited to the precise details of construction shown as changes may readily be made without departing from the spirit of my invention, but

Having thus described my invention I claim as new and desire to secure by Letters Patent the following:—

1. A band making machine having facility for positioning strips that are to be formed into bands and including unitary mechanism having a forming portion movable transversely of the plane in which the strip to be operated upon is positioned, thereby to operate upon the face of the strip; means coöperating with the forming portion to curl the strip and thereby effect the approach of the strip ends into the approximate dimension of the band; and means for curling the partially formed band to cause the material to be curled in cross section.

2. A band making machine including unitary mechanism having relatively movable jaws operating upon a face of a strip for effecting the approach of the strip ends and bending such strip into the approximate dimensions of the band; a forming body between the jaws and coöperating with the jaws to bend strip material into the approximate dimensions of the band; and mechanism for curling the material of the band after its dimensions have been approximated to cause said material to be curled in cross section.

3. A band making machine including unitary mechanism having one set of relatively movable jaws; a forming body between the jaws and coöperating with the jaws to bend strip material into the approximate dimensions of the band; a second set of relatively movable jaws having recesses into which the material of the partially formed band may be pressed to cause said material to be curled in cross section; and means for pressing the partially formed band into said recesses of the second set of jaws.

4. A band making machine having relatively movable jaws; a forming body between the jaws and coöperating with the jaws to bend strip material into the approximate dimensions of the band; an element for receiving the partially formed band and shaping it so as to curl the material thereof in cross section; and means for removing the band, when partially formed, from between the aforesaid jaws and forcing it into engagement with the element that curls the band.

5. A band making machine having a set of relatively movable jaws; a forming body between the jaws and coöperating with the jaws to bend strip material into the approximate dimensions of the band; a second set of relatively movable jaws recessed to cause the partially formed band to curl in cross section when said band is forced into the recessed portions of the second set of jaws; and means for removing the partially formed band from between the first set of jaws and forcing it into the recessed portions of the second set of jaws.

6. A band making machine having relatively movable jaws, a forming body between the jaws and coöperating with the jaws to bend strip material into the approximate dimensions of the band; an element for receiving the partially formed band and shaping it so as to curl the material thereof in cross section; and means for removing the band, when partially formed, from between the aforesaid jaws and forcing it into engagement with the element that curls the

band, the forming body and the jaws being relatively movable transverse to the plane of the jaws, said jaws operating to strip the band, after it has been curled, from the forming body when relative movement has been established between the forming body and the jaws in such a direction transverse to the plane of the jaws as will enable the formed band to be stripped from the forming body.

7. A band making machine having a set of relatively movable jaws; a forming body between the jaws and coöperating with the jaws to bend strip material into the approximate dimensions of the band; a second set of relatively movable jaws recessed to cause the partially formed band to curl in cross section when said band is forced into the recessed portions of the second set of jaws; and means for removing the partially formed band from between the first set of jaws and forcing it into the recessed portions of the second set of jaws, the forming body and the jaws being relatively movable transverse to the plane of the jaws, the first set of jaws operating to strip the band, after it has been curled, from the forming body when relative movement has been established between the forming body and the jaws in such a direction transverse to the plane of the jaws as will enable the formed band to be stripped from the forming body.

8. A band making machine having relatively movable band forming jaws; and a forming body between the jaws and coöperating with the jaws in forming the band, said forming body and jaws being relatively movable transverse to the plane of the jaws whereby the band may be pressed against the jaws and thereby be dislodged from the forming body.

9. A band making machine including a holde for the bands temporarily to retard their discharge; and a source of heat located in position to enable heat to be applied to said bands while their discharge is being retarded.

10. A band making machine having a set of relatively movable jaws; and a forming body between the jaws and coöperating with the jaws to bend the material of which the band is to be formed into the approximate dimensions of the band, one of said jaws being recessed to receive one end of the material of which the band is to be formed to enable this end to overlap its companion end.

11. A band making machine including unitary mechanism having a forming portion operating upon a face of a strip for effecting the approach of the strip ends and bending such strip into the approximate dimensions of the band; an element for receiving the partially formed band and shaping it so as to curl the material thereof in cross section; and means for removing the band, when partially formed, from the first aforesaid shaping mechanism and forcing it into engagement with the element that curls the band.

In witness whereof, I hereunto subscribe my name this twenty-eighth day of July A. D., 1911.

OLOF N. TEVANDER.

Witnesses:
E. L. White,
G. L. Cragg.