May 26, 1942. A. PRAEMASSING 2,283,947

DEVICE FOR THE PRODUCTION OF METAL BAND JOINTS

Original Filed March 18, 1936 4 Sheets-Sheet 1

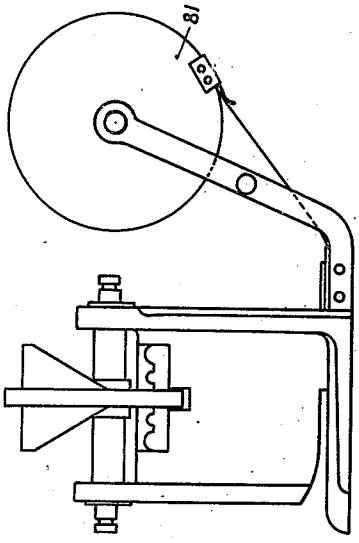


Fig. 13

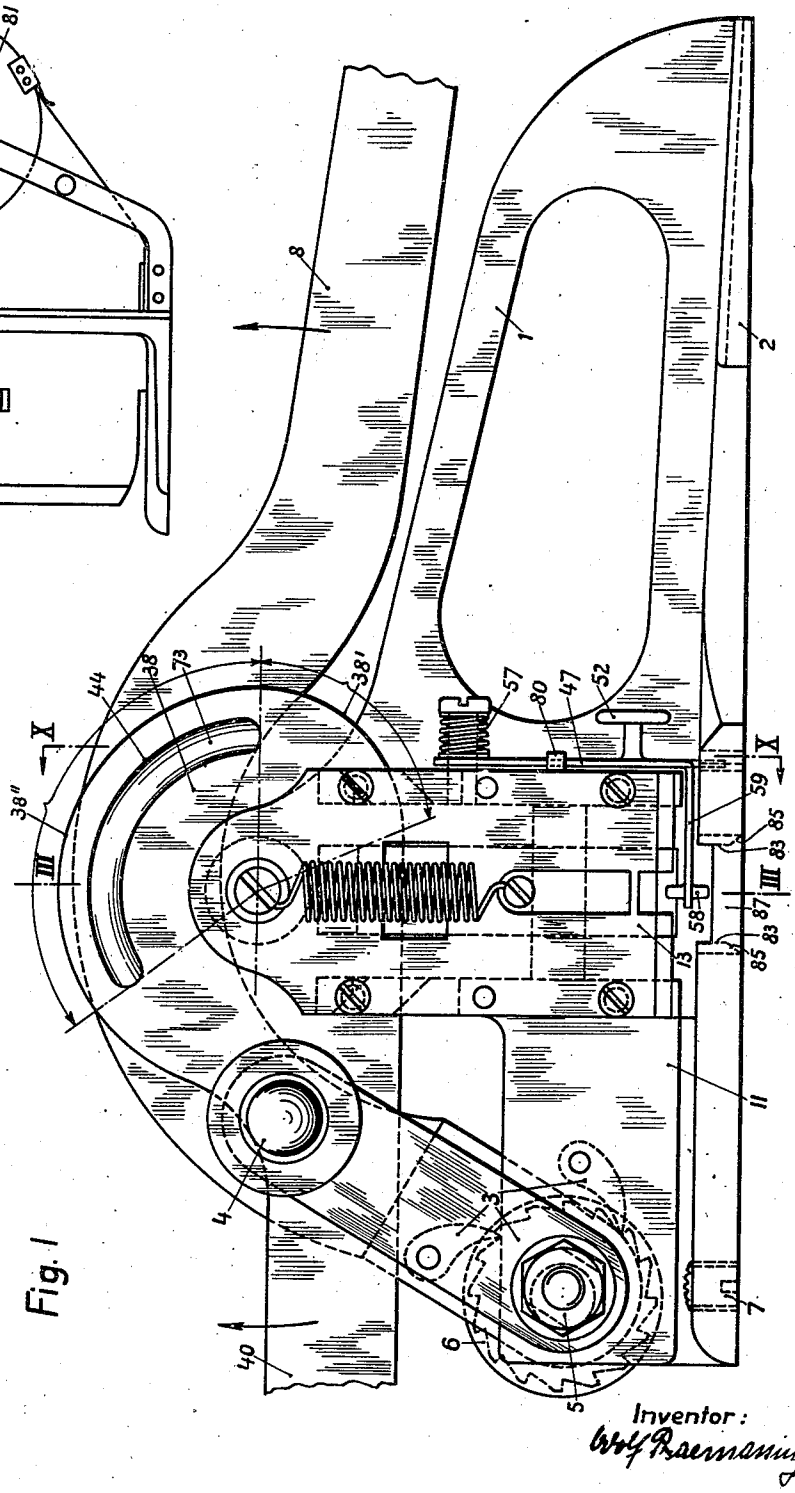


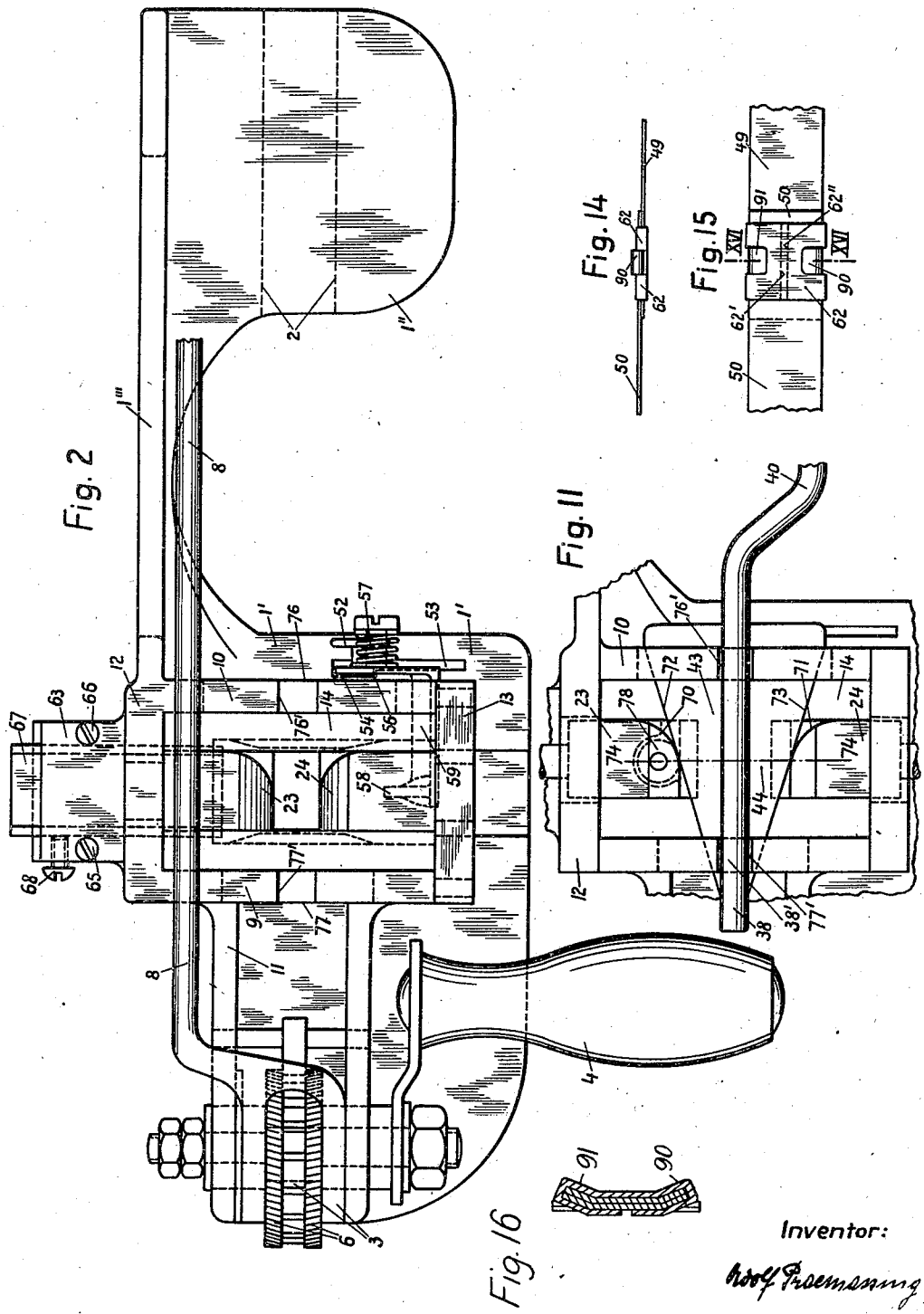
Fig. 1

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DEVICE FOR THE PRODUCTION OF METAL BAND JOINTS

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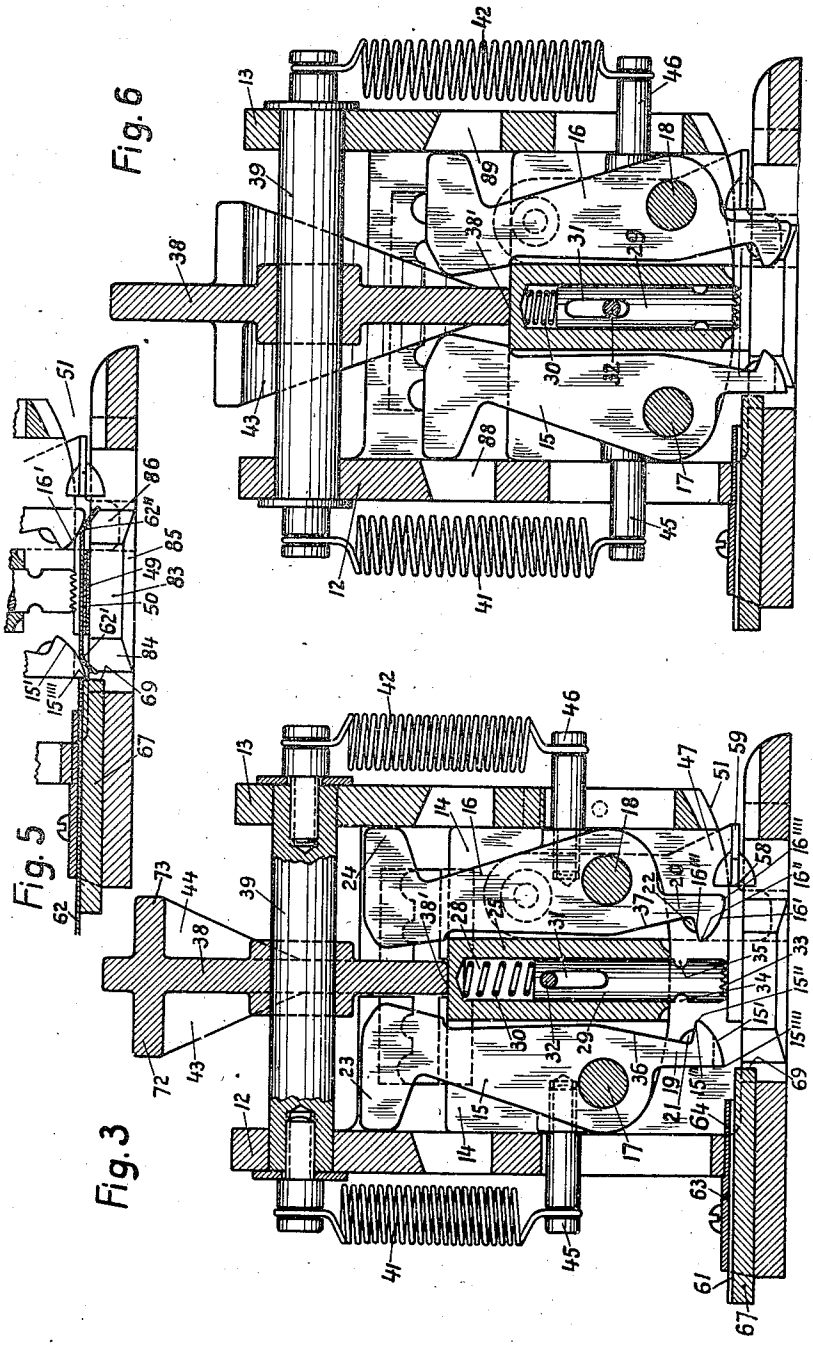


Fig. 6

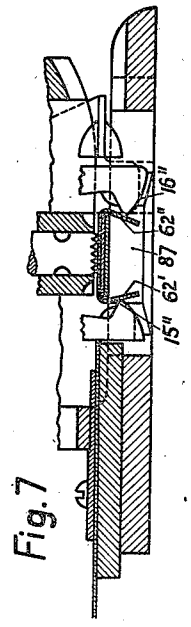


Fig. 7

Fig. 5

Fig. 3

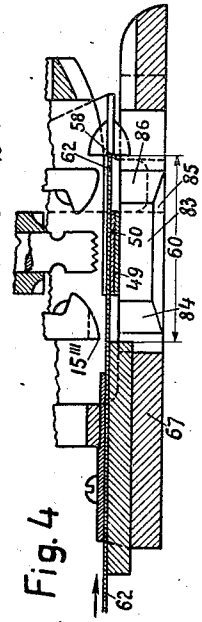


Fig. 4

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DEVICE FOR THE PRODUCTION OF METAL BAND JOINTS

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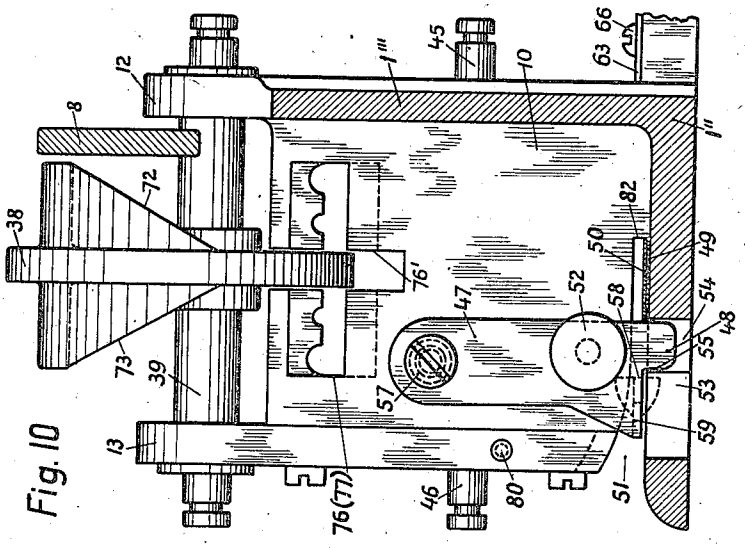


Fig. 10

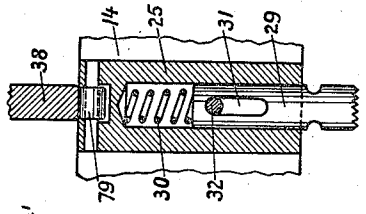


Fig. 12

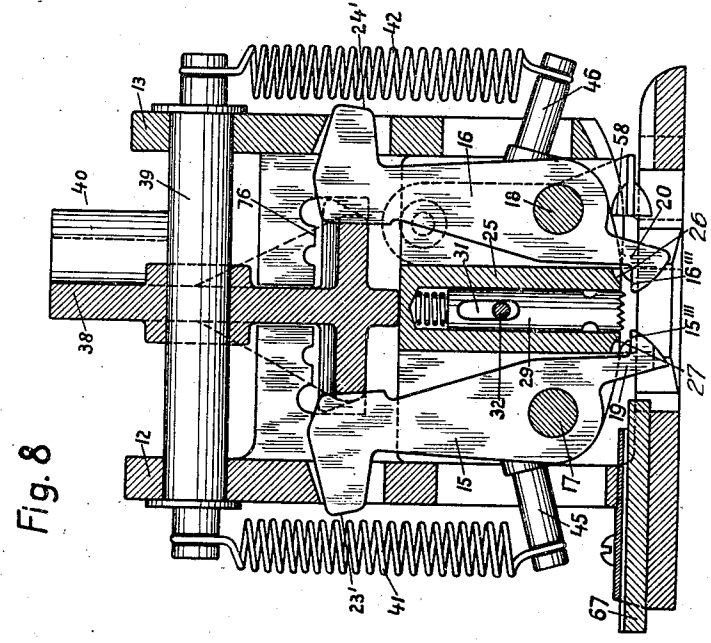


Fig. 8

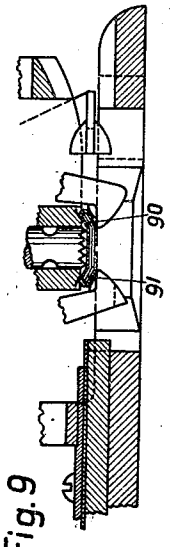


Fig. 9

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Patented May 26, 1942

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UNITED STATES PATENT OFFICE

2,283,947

DEVICE FOR THE PRODUCTION OF METAL BAND JOINTS

Adolf Praemassing, Cologne-Merheim, Germany

Application March 18, 1936, Serial No. 69,574. Renewed March 18, 1940. In Germany March 20, 1935

13 Claims. (Cl. 81—9.1)

Processes and devices for the production of metal band joints, which consist of sleeves subjected to alterations of shape which embrace the overlapping band ends and ensure the joint against tension, are already known. These closing or locking means were first used in the form of previously prepared sleeves to be slipped over the band ends. However, special means, which increased the costs of manufacturing such sleeves, were required for completely adapting such sleeves to the configuration of the overlapping metal band ends. It has therefore also been proposed to make the sleeves from a metal band which is hereinafter called a sleeve band and is specially fed for the said purpose. Parts of the sleeve band which project over the band ends are brought under the influence of two jaws approaching each other so that there takes place in corresponding recesses of the jaws a crimping of these parts at an angle of 180° whereupon the crimped parts are closed relatively to the sleeve in a direction parallel to the plane of the band ends. It was necessary to use sleeve bands of a special configuration and design because the sleeve band was fed in a direction parallel to the longitudinal direction of the superposed band ends. It would thereby be necessary for the sleeve band to surround those parts above the band ends which constitute the free limbs of the sleeve after the alteration in shape. Moreover, the parts of the sleeve band, which correspond to the subsequent sleeves, are interconnected only for a comparatively small extent of the width of the sleeve band so that the severance of the individual parts in the closing direction will not be unnecessarily impeded.

The present invention has for its object to develop the process and device for the production of such metal band joints in such a manner that a sleeve band of any configuration and design may be used and more particularly a sleeve band which fully corresponds, at least according to the configuration, with the metal bands to be connected. Since the width of the sleeve band is also thereby reduced to an extent which readily permits the parts for forming the sleeves to be severed from the remainder of the sleeve band in connection with the usual type of such closing devices, the necessity for a special design of the sleeve band is also dispensed with whereby the costs of such closing or fastening devices can be reduced to a minimum.

The said problem is solved according to the invention in such a manner that when joining the overlapping ends of a band hoop with a sleeve placed as a band portion undeformed over the ends, the sleeve band is fed parallel to the plane of the band and transversely to the longitudinal direction of the band ends to be wrapped. It is obvious that this parallel guiding applies only to that stage of the closing process in which the sleeve band bears against the band ends to be wrapped.

The devices for carrying out the improved method can be made in the most varied ways. They are preferably characterized by the fact that the tool, which is arranged perpendicularly to the metal band plane, is a shaping tongs for cutting off the transversely fed metal band to sleeve length, said tongs being lowered for the cutting off operation. The sleeve simultaneously begins to be formed and the tongs are expanded for producing the shape when closing band ends and sleeve. The lever, which is close to the side where the sleeve band is introduced, is designed on the lower outer edge as a cutting device. It is possible by moving the two tool levers in the direction toward the sleeve band to sever the length of the sleeve band, which is required for forming the sleeve, in such a manner that those parts of the sleeve band project over the band ends which would form at an angle of 180° the free limbs of the sleeve bearing firmly against the band ends. By continuing the severing movement, the free limbs of the sleeve band, which is cut to the proper length, are disposed at an angle of 90° above the band ends. The rocking movement of the tool levers, which is then to be initiated, renders it possible to dispose the limbs of the sleeve band over the band ends at a further angle of 90° so that the sleeve band assumes the shape of the sleeve. An anvil-like abutment bears upon the central part of the sleeve band and when the tools firmly bear against the parts of the sleeve band which are disposed at an angle, the sleeve thus formed is adapted to encompass the band ends with sufficient preliminary tension. During or after the formation of the sleeve, those means are effective which produce the alterations of shape for ensuring the connection against tension. It is possible by suitably designing the angular parts of the tools to wrap the band ends with the sleeve band so that the sleeve band corresponds to the configuration of the overlapping band ends whereby a sleeve bearing firmly against the band ends is formed without it being necessary to produce special force effects for that purpose.

The annexed drawings show an embodiment of

the inventive idea by way of example as a case fastening appliance.

Fig. 1 is a side view of the appliance;

Fig. 2 represents a plan of the appliance with the actuating handle removed, together with the corresponding parts;

Fig. 3 represents a perpendicular cross-section on the line III—III of Fig. 1 in the initial position of all the parts;

Fig. 4 shows in the same position as Fig. 3, the allocated position of the work pieces;

Fig. 5 shows an intermediate position, whilst

Fig. 6 is the lowest position of the slide and the tools;

Fig. 7 shows the position of the work pieces corresponding to Fig. 6;

Fig. 8 shows in the same view as Figs. 3 and 6, the terminal position which occurs in the making of the metal band fastener, whilst

Fig. 9 again shows the allocated position of the work pieces corresponding to the representation of Figs. 4, 5 and 7;

Fig. 10 is a section on the line X—X of Fig. 1;

Fig. 11 is a plan of the tool heads with wedge piece forced in;

Fig. 12 shows a somewhat altered embodiment of the slide;

Fig. 13 shows an arrangement in which the metal band serving for making the fastening pieces is taken from a separate roller;

Fig. 14 is a side view and

Fig. 15 is a plan, of the metal band fastener made by way of example;

Fig. 16 represents a vertical cross-section through the fastener on the line XVI—XVI of Fig. 15.

In all the figures, 1 indicates the body of the appliance which consists of two base plates 1', 1'', which are held together by a cross piece 1''' running substantially perpendicularly to the base plates. The base plate 1'' contains substantially the guiding devices for the two ends of the metal band which after being placed around the material to be packed with a certain tension are joined together by a fastener to be made according to the invention. The two metal band ends to be joined together are designated 49 and 50 in Fig. 14. The guiding devices for the metal band end 49 have a recess 2 in the base plate 1'', the sole of which rises in the direction toward the tensioning device, to be hereinafter described, to the height which is necessary for making the requisite alterations of shape of the sleeve band adapted for making the sleeve. However, the base plate 1' carries the tensioning device 3, which is made as a double ratchet drive. An eccentric 5 adjustable by means of a handle 4 permits shifting the friction wheels 6 in height, so that the friction wheels can be made to rest on the upper of the overlapping metal bands. An anvil 7 grooved on its upper surface holds fast under the pressure of the eccentric 5 the lower 49 of the overlapping metal bands 49, 50 (see Figs. 14 and 15) so that now by the actuation of the handle 8, the ratchet drive can be brought into operation under the effect of which the necessary tensioning can be imparted to the metal band hooping. The handle 8 rotates on the axis of the two ratchet wheels 6 and engages thereon over the ratchet pawls 3.

In addition to the apparatus 3 the base plate 1' carries a device for wrapping a metal strip around the overlapping ends of the metal band. This device is hereafter described in detail and is provided with cutting means for severing the metal strip and wrapping the severed end around the overlapping ends of the metal band. The device further includes means for deforming the metal strip and the overlapping ends of the metal band to provide a tension-resisting connection of the ends of the metal band. The device consists of a casing the three walls of which are arranged perpendicularly to the base plate 1'. The two opposite walls 9 and 10 of the casing as shown in Fig. 2 are secured together by a third wall 12 while the fourth side wall 13 which is secured to the walls 9 and 10 by screws forms together with the other walls an opening extending perpendicularly to the base plate for guiding the slide member 14. The two ribs 11 between which the tensioning device is arranged also extend perpendicularly to the base plate and merge into the wall 9. The slide 14 is H-shaped in cross-section as shown in Figs. 2 and 11. In the recess formed by the H-shaped design of the slide 14 tools 15 and 16 are rotatably supported at 17 and 18 and the tool 15 is designed for severing the metal strip which is to be wrapped around the overlapping ends of the metal band. The tools 15 and 16 consist of double-armed levers which oscillate about the hinge bolts 17 and 18 already mentioned. The lower arms are made in the form of a foot, so that a tool sole 15', 16', a tool point 15'', 16'', a foot back 15''', 16''' and a tool heel 15'''', 16'''', can be distinguished. The construction of the tool feet is here entirely the same with the single exception that the tool heel 15'''', is made as a cutting edge. Both tool feet show in the gorge between the backs 15''', 16''' the projections 19, 20 making the connection with the tool body 15, 16, while dies 21, 22, are arranged in the centre of the wedge, that is symmetrically with respect to the pivot axes 17, 18. The upper arms of the tool bodies 15, 16, terminate in powerful heads 23, 24 the construction of which is seen more fully from Fig. 2. The centre beam or bar 25 of the carriage 14 is at 26, 27 made as the matrix for the patrix, or cutting dies 21, 22. The centre bar 25 of the carriage 14 receives the press plunger 29 in a central recess 28. The connection between press plunger 29 and the centre bar 25 is here made positive, the press plunger 29 being under the action of a powerful pressure spring 30. A cross bolt 32 passing through the oblong hole 31 of the press plunger prevents the press plunger from being able to leave its position. The surface 33 of the press plunger resting on the work is roughened, so that the work is held immovable. Recesses 34, 35 on the press plunger permit entry of the tool points 15'', 16'', so that these are not injured in consequence of unskilful treatment of the appliance. The flanks 36, 37 of the tools thereby come to rest on the centre bar 25 before contact between the feet of the tool and the press plunger can take place.

The carriage 14 is driven by an eccentric disk 38 which is rotatably mounted on the shaft 39 secured in the walls 12, 13 of the casing. This eccentric disk 38 terminates in a handle 40, as shown in Fig. 1. The springs 41, 42 constantly draw the carriage 14 against the lower limiting edge 38', 38'' of the eccentric disk 38 so that the carriage constantly bears against the eccentric disk. Perpendicularly to the plane of the disc, the disc 38 carries wedge pieces 43, 44 curved in arc shape, and made perfectly symmetrical with respect to a centre plane of the disc 38. The eccentricity of the disc 38 is, as shown in Fig. 1,

so arranged that the limiting edge of the disc only has in the range 38' an increasing distance from the centre point of rotation. On the contrary, the limiting edge 38'' runs in the range of the wedge pieces 44 completely concentrically to the central pivotal point. Under the influence of the part 38' of the eccentric disk, the carriage 14 is lowered and the piece of the sleeve band required for making the sleeve is cut off and the limbs projecting over the metal band ends 49, 50 are bent downwardly assuming a U-shape. However, the carriage 14 remains stationary during engagement of the part 38'' and the tools 15, 16 rotate on the shafts 17, 18, so that the sleeve band is transformed to a sleeve and the sleeve undergoes those alterations of shape which ensure the fastener.

The tools 15 and 16 are prevented from oscillating or turning on the pivots 17 and 18 during such downward movement of the carriage 14 by means of projections 23 and 24 which engage the side walls 12 and 13 of the casing. The means for preventing oscillation of the tools during the initial downward movement thereof also includes the springs 41 and 42 which biases the upper ends of the tools towards each other.

The springs 41, 42 are not attached to the carriage 14 but to the tool body 15, 16 through the pins 45, 46 in such manner that the tensional direction is located externally of the joint bolts 17, 18. The springs 41, 42 thereby draw not only the carriage 14 towards the disc 38 but tend also to draw the tools towards each other and thus against the direction of movement which is effected by the forcing in of the wedge pieces 43, 44 between the tool heads 23, 24. As shown by Fig. 8, the heads can be so drawn by projections 23', 24' towards the springs 41, 42 that these are deflected out of the tensional direction and by their tendency to shorten tend to force the heads 23, 24 back into the casing. In this way the action of the spring tensional forces engaging through the pins 45, 46 is amplified in consequence of the engagement on the longer lever arms 15, 16.

As shown in particular by Figs. 2 and 10, there is rotatably hinged on the casing wall 10 a stop 47 which has first of all a projection 48 which serves for fixing the metal bands 49, 50 to be joined in the overlapped position. In order to facilitate the introduction into the apparatus of the metal bands to be joined together, the walls 9 and 10 of the casing have a lateral introducing slot 51 (see Fig. 10). As there is a danger that the metal bands 49, 50 automatically leave their position, they must be protected by a stop 48 from an automatic variation of their position. The reasons why the exact position of the metal bands 49, 50 is necessary have been already mentioned above. In order that the stop 47, 48 which is actuated through the head 52 does not automatically leave its position, the slot 53 of the base plate 1 is somewhat widened at 54 so that the narrow surface 55 of a stop 48 bears against the stop 56 formed thereby. A spring 57 here ensures the pressing of the part 47 in the direction of the casing wall 10. In addition to the stop 48, the device 47 has a further stop 58 for the metal band to be introduced into the apparatus. In other words the member rotatably mounted at 57 forms the stop 48 for the band ends 49 and 50 and this stop is connected to the stop 58 by means of an angular projection 59 as shown in Fig. 1. The stop 58 limits the length 60 (see Fig. 4) of the metal band 62 introduced through the inlet slot 61 into the device to an amount which makes the metal band length between the stop 58 and the cutting edge 15'''' correspond exactly to the length necessary for making the fastening piece. If therefore after the introduction of the metal bands 49, 50 which are in the overlapped position, the stop plate 47 is brought into the position shown in Fig. 10 in which the position, necessary for making the fastening piece, of the metals bands 49, 50 to be joined together is clearly determined, then the stop 58 is also in a position in which it correctly adjusts the length 60 of the metal band 62 serving for making the fastening piece. The inlet slot 61 has, as shown in particular by Figs. 2 and 3, a cover plate 63 which extends towards the tools 15, 16 in the form of a flexible tongue which rests on the metal band 62. By means of adjusting screws 65, 66, the height of the inlet slot can be varied within fine limits. The backing part 67 limiting the inlet slot 61 at the bottom is carried in slide form and is made adjustable through the screw 68, so that its limiting surface 69 can be so adjusted that it lies exactly perpendicularly under the cutting edge 15'''' of the tool 15.

As shown in particular by Fig. 11, the inner limiting edges 70, 71 of the tool heads 23, 24 have such a shape that the points of contact with the edges 72, 73 of the wedge pieces 43, 44 always correspond to a centre plane 74, through the tools. In this way, one-sided stresses of the tools are entirely avoided.

The casing walls 9 and 10 guiding the carriage 14 are cut through at 76 and 77 in T-form, as is shown in particular by Figure 10. The casing walls 9 and 10 limiting the center limbs of the T-shaped recess 76' or 77' bear firmly against the lateral, flat limiting surfaces of the eccentric disk 38 so that they effect an additional guiding of the eccentric disk.

It may be advisable to provide roller bearings at the parts where the greatest friction takes place. The bearings can for example be arranged in the head pieces 23, 24, the tool bodies 15, 16 in the form of rollers 78 (see Fig. 11) which rest on the active surfaces 72, 73 of the wedge pieces 43, 44. It is also possible to arrange on the slide 14, a roller 79 (see Fig. 12) through which the cam disc 38 effects the drive of the slide.

The method of operation of the device described is as follows. After the metal band preferably taken from a supply roll has been placed around the package to be hooped in such manner that the initial piece of the metal band overlaps the metal band taken from the roll, the metal band after opening the stop plate 47 is placed by means of the inlet slot 51 in the position shown in Fig. 10 and the stop 47 is then brought into the position also shown by Fig. 10, in which the stop 48 clearly determines the position of the metal band 49, 50 to be joined, when in the overlapped position. A stop 80 (see Figs. 1 and 10) here prevents too great a swinging out of the member 47, leading to interruptions. The eccentric 5 is then lowered to such an extent that the friction wheels 6 rest firmly on the upper metal band 50. By the actuation of the handle 8, the upper metal band piece 50 can be so pressed against the lower metal band 49 that there is adjusted in the metal band hoop the desired tension. The length of metal band left free by the tensioning is again wound on the reel and the metal band which is on the reel is severed from the hooping.

Metal band 62 is then introduced through the inlet slot 61 until the end of the metal band 62 comes against the stop 58. This position is shown in Fig. 4. The metal band 62 can be similar to the metal band which is used for making the metal band hooping. Consequently, all the waste pieces produced in the making of the metal band hooping can be utilised, since the waste pieces have at least the length 60 necessary for making the fastening piece. To facilitate the carrying out of the fastening process, however, the metal band 62 can be unwound from a separate reel 81 as is shown in Fig. 13. The possibility is then given of using a comparatively soft material of great tenacity whereas in general hard and consequently more brittle materials are preferred for the metal band hooping.

The handle 40 is now rotated clockwise from the position shown in Fig. 1. The limiting edge 38' of the cam or eccentric disc 38, the distance of which from the axis of the pivot bolt 39 continuously increases, thereby drives the slide 14 and with it through the hinge bolts 17, 18 the tools 15 and 16 downwards towards the metal band joint 49, 50, 62, and the counter action of the springs 41, 42 is overcome. During such downward movement of the slide member or carriage 14 the tools 15 and 16 are prevented from oscillating on the bolts or pivots 17 and 18 by means of the projections 23 and 24 which slide along the inner walls 12 and 13 of the casing. Directly afterwards, the cutting edge 15'''' which is preferably made of sickle shape, comes on to the metal band 62, so that the band on the continuation of the movement is sheared. The backing 69 here forms with its limiting surface 68, the counter cutting edge. The length 60 of the part cut off provides the length of the fastening piece, which is, twice the width of the metal band plus four times the thickness of the metal band. On the continuation of the movement, the soles 15', 16' of the tools 15 and 16 rest on the free lugs 62' 62'' of the piece of metal band cut off. But before this first alteration of shape of the piece of metal band cut off is carried out, the notched end surface 33 of the press rod 29 is engaged with the metal band joint. This metal band joint acts, owing to it being on the one hand enclosed between the limiting edge 82 (see Fig. 10) and the stop 48, and on the other hand being supported over its entire surface up to the width of the metal band 62 by the base plate 1'—see the polygonal limiting surfaces 83—86 of the well-like recess 87 of the base plate—as a fixed backing or anvil, so that no alterations of shape can take place except those of the free lugs 62', 62''. Fig. 5 shows the apparatus in the position thus described. If the rotary movement of the disc 38 is continued, the slide 14 reaches its lowest position at the moment when the handle 40 has been rotated by 90° from the initial position shown in Fig. 1. At the same time, the free lugs 62', 62'' have been transferred into a position in which they are perpendicular to that of the metal band piece which is clamped between the metal bands 49, 50 forming the backing piece or anvil and the press plunger 29. Thus, the piece 62 cut off from the metal band has assumed a U-shape form with free limbs directed downward. If now the handle 40 is still further rotated, the limiting edge 38'' comes into contact with the plunger 14. Since the limiting edge 38'' is located concentrically to the axis of the pivot bolt 39, the position of the slide 14 remains unaltered. In this position the spring 30 of the press plunger 29 is compressed in such a manner that the force exerted by the plunger 29 is greater than the forces which tend to bend outwardly the centre limb of the piece 62 of the metal band bent into U-shape.

However, the wedge pieces 43, 44 with their limiting edges 72, 73 have meanwhile entered between the head pieces 23, 24 of the tools 15, 16, as is clearly to be seen from Fig. 6. By means of the penetrating wedge pieces, the heads 23, 24 are forced apart, oscillating the tool bodies 15, 16 about the hinge bolts 17, 18, so that they penetrate into recesses 88, 89 of the casing walls 12, 13. Owing to the oscillation of the tools 15, 16 the points 15'', 16'' of the tool feet, which in the meantime towards the conclusion of the movement of the slide towards the metal band have come to rest on the lugs 62', 62'', approach each other, so that the lugs under the influence of this approach are moved inwards. Since the points of the feet of the tool up to the time when the tools 15, 16 are rocked, have a distance apart corresponding to the width of the metal band plus twice the thickness of the metal band, there takes place a sharp bending of the free lugs 62', 62'' round the limiting edges of the metal bands 49, 50 when in the overlapped position. Owing to the fact that the points 15'', 16'' of the feet of the tools move during the oscillation movement of the tools relatively toward the free lug ends 62', 62'' these lugs bear against the points of the tools with a preliminary tension due to the elasticity of the material. The inward movement of the free lugs takes place during the exertion of forces thereon which are positioned away from the bending points and the two edges of the metal bands 49, 50, so that during the inward movement of the free lugs, the formation of the metal band piece 62 on the metal bands 49, 50 is accomplished.

Fig. 8 shows the terminal position of this movement in which the backs 15''', 16''' of the feet of the tools 15, 16 have reached a horizontal position. Thus the metal band joint 49, 50, 62 is at the last subjected to a powerful closing pressure directed perpendicularly to the plane of the metal band, which produces the connection due to friction between the metal band piece 62 now forming the fastening piece, and the metal bands 49, 50, connected together. In order that a tension-resisting connection may be obtained cutting dies 21 and 22 are provided between the parts 19 and 20 and the tool back 15''' and 16''' which dies press out the marginal parts 90 and 91 of the metal band joint from the metal band planes and cut them perpendicular to the metal band planes while recesses 26 and 27 provided in the slide 14 act as matrices to receive the bulged portions of the metal band joint. In this way a shaped metal joint fully withstanding tension and pressure is made, as is shown in Figs. 14–16. After the production of this metal connection, the stop piece 47 is shifted into the position exposing the inlet slot 51, the stop 48 being brought by tension on the head 52, against the action of the spring 57, out of the range of the stop surface 55. The base plate 1' between the packed material and the metal band hooping can then be drawn out. The lever 40 is then brought back into the initial position shown in Fig. 1. The tension springs and if necessary the deflected springs are shortened so that the slide 14 as well as the tools 15, 16 are

returned to the initial position by means of the pins 45, 46.

It is within the essence of the invention that by means of the device described, fastening pieces differing entirely from Figs. 14–16 can be prepared. In particular by a different construction of the tool feet and in particular by a different construction and arrangement of the matrices and dies, whether these be provided in the tools themselves or in the slide, any desired connection or joint based on friction or shape, can be attained.

I claim:

1. In a device for making metal band joints by wrapping a metal strip around the overlapping ends of a metal band, a casing having a slide member reciprocable therein, means for cutting a metal strip arranged transversely of the overlapping ends of said band to serve as a sleeve band, said means comprising a tool lever having one end arranged adjacent the band ends, said end of the tool lever having a cutting edge extending parallel with respect to the band ends and transverse with respect to the sleeve band, another tool lever, said levers being pivotally mounted on said slide member to oscillate in a plane perpendicular to the plane of the band ends, means for oscillating said levers, and means for moving the slide member in a direction perpendicular to the plane of the band ends.

2. Apparatus according to claim 1 in which the ends of the levers adjacent the band ends are provided with extensions having pointed ends projecting in opposite directions, and the means for oscillating the levers engaging the opposite ends of the levers for moving the pointed ends towards each other.

3. Apparatus according to claim 1 in which a cutting die is provided on each lever adjacent the lower ends thereof.

4. Apparatus according to claim 1 in which the lower ends of the tool levers are provided with extensions, and means for preventing rotation of the levers on their pivots during initial movement of the slide member.

5. Apparatus as claimed in claim 1 in which the two levers are provided with inwardly projecting extensions on the lower ends thereof, the upper surfaces of said extensions being inclined with respect to the plane of the band end in the inoperative position of the levers.

6. In a device for binding the overlapping ends of a metal band, means for guiding said metal band, means for guiding a metal strip transversely to the first mentioned means, cutting means for severing an end portion of the metal strip, a stop member positioned to be engaged by the free end of said metal strip and spaced a distance from said cutting means which is equal to twice the width of the metal band plus four times the thickness thereof, means for holding said severed strip adjacent one face of the overlapping ends of the metal band, means for bending the end portions of the severed metal strip to lie along the other face of the overlapping ends of the band, and means for deforming said severed metal strip and the overlapping ends of said band to prevent longitudinal movement of one band end with respect to the other.

7. In a device for binding the overlapping ends of a metal band, means for guiding said band, means for guiding a metal strip transversely to said means, a frame including a casing, a slide member movable within the casing, tool levers pivotally mounted on said slide member, a cutting edge carried by one of said tool levers for severing said metal strip, a plunger arranged between said tool levers, a spring urging said plunger towards said metal strip, a pin and slot connection between said plunger and said slide member, a cam engaging the slide member for moving said slide member in the casing to move the tool levers into engagement with and bend ends of the metal strip, an extension carried by each tool lever, additional cam means movable between the tool levers for engaging and pivoting the tool levers after operation of the first cam so that the extensions of the tool levers are moved towards each other to further bend the ends of the metal strip around the overlapping band and provide bearing means below the plunger.

8. In a device for bending the overlapping ends of a metal band, means for guiding said band, means for guiding a metal strip transversely to said means, a frame including a casing, a slide member movable within the casing, tool levers pivotally mounted on said slide member, a cutting edge carried by one of said tool levers for severing said metal strip, a cam engaging the slide member for moving said slide member to move the tool levers into engagement with the metal strip and bend ends thereof over the band ends, projections carried by the tool levers engaging the casing preventing oscillation of said tool levers during said movement of the slide member, an inwardly projecting extension carried by each tool lever, another cam movable between the tool levers for engaging and pivoting the tool levers after operation of the first cam so as to move the extensions of the tool levers towards each other and further bend the ends of the metal strip around the overlapping band, and means for deforming the metal strip and the overlapping ends of said metal band.

9. In a device for bending the overlapping ends of a metal band, means for guiding said band, means for guiding a metal strip transversely to said means, a frame including a casing, a slide member movable within the casing, too levers pivotally mounted on said slide member, a cutting edge carried by one of said tool levers for severing said metal strip, outwardly extending projections carried by each tool lever engaging the casing, a cam engaging the slide member for moving said slide member and the tool levers into engagement with the metal strip so as to bend end portions thereof, said casing having recesses therein for receiving said projections after said movement of the slide member, an extension carried by each tool lever, and another cam movable between the tool levers for engaging and pivoting the tool levers after operation of the first cam so as to move the extensions of the tool levers into engagement with the bent ends of the metal strip and further bend the same around the overlapping band.

10. In a device for bending the overlapping ends of a metal band, means for guiding said band, means for guiding a metal strip transversely to said means, a frame including a casing, a slide member movable within the casing, tool levers pivotally mounted on said slide member, a cutting edge carried by one of said tool levers for severing said metal strip, outwardly extending projections carried by each tool lever engaging the casing, a cam engaging the slide member for moving said slide member and the tool levers into engagement with the metal strip

so as to bend end portions thereof, said casing having recesses therein for receiving said projections after said movement of the slide member, an extension carried by each tool lever, another cam movable between the tool levers for engaging and pivoting the tool levers after operation of the first cam so as to move the extensions of the tool levers into engagement with the bent ends of the metal strip and further bend the same around the overlapping band, and springs biasing said tool levers to an inoperative position.

11. In a device for binding the overlapping ends of a metal band, means for guiding the metal band, means for guiding a metal strip transversely to the first mentioned means and along one face of the overlapping ends of the metal band, cutting means for severing an end portion of the metal strip, means for bending end portions of the severed metal strip to lie along edges of the overlapping ends of the metal band, means for further bending the end portions of the metal strip to lie along the other face of the overlapping ends of the band, and means for deforming said bent metal strip and the overlapping ends of said band to prevent longitudinal movement of one band end with respect to the other.

12. In a device for binding the overlapping ends of a metal band, means for guiding said band, means for guiding a metal strip transversely to said means, a casing, a slide member movable within the casing, tool levers pivotally mounted on said slide member, a cutting edge carried by one of said tool levers for severing said metal strip, a cam engaging the slide member for moving said slide member in the casing to move the tool levers into engagement with and bend ends of the metal strip, projections carried by said tool levers engaging the casing preventing oscillation of the tool levers during said movement of the slide member, an extension carried by each tool lever, another cam movable between the tool levers for engaging and pivoting the tool levers after operation of the first cam so as to move the extensions towards each other to further bend the ends of the bent metal strip around the overlapping band, an arm rotatably mounted on the casing, and a stop member carried by said arm spaced from the cutting edge of said tool lever.

13. In a device for binding the overlapping ends of a metal band, means for guiding a metal strip transversely to said means, a casing, a slide member movable within the casing, tool levers pivotally mounted on said slide member, cutting means carried by one of said tool levers for severing said metal strip, a rotatable cam engaging the slide member between the tool levers for moving said slide member in the casing and moving the tool levers into engagement with the metal strip to bend ends thereof, an extension carried by each tool lever, projections carried by the tool levers engaging the casing preventing oscillation of the tool levers on the pivots during rotation of said cam, lateral cam means carried by the first cam for engaging and pivoting the tool levers after operation of the first cam to swing the tool levers and the extensions thereof into engagement with the bent ends of the metal strip to further bend the ends around the overlapping band, and yieldable means for biasing the tool levers against the lateral cam means.

ADOLF PRAEMASSING.