(No Model.) 4 Sheets—Sheet 1.

J. T. MORROW.

MEANS FOR SECURING METALLIC OR OTHER SHEETS TOGETHER.

No. 600,498. Patented Mar. 8, 1898.

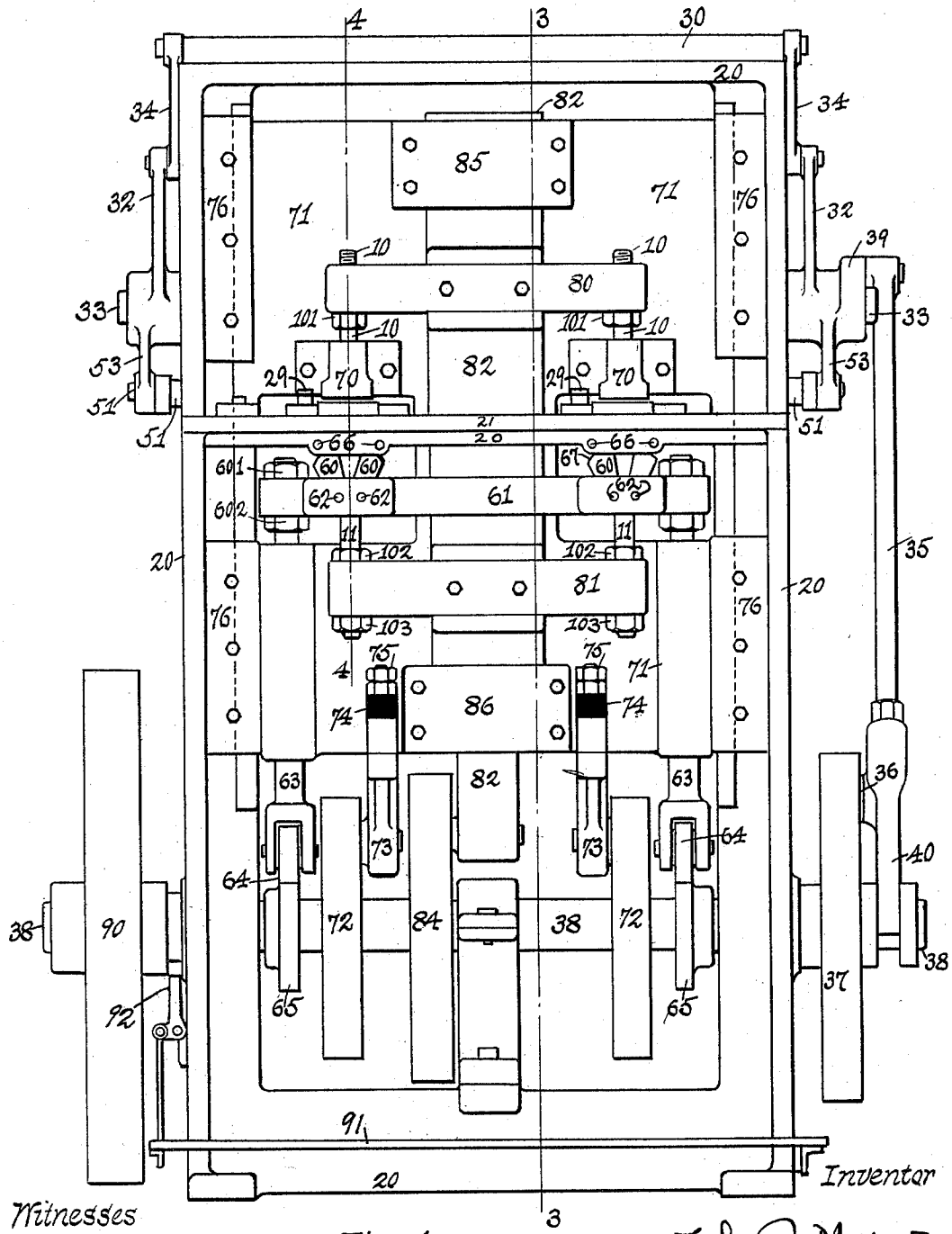


Fig. 1.

Witnesses
J. Landgraf
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by Harold B. Miney
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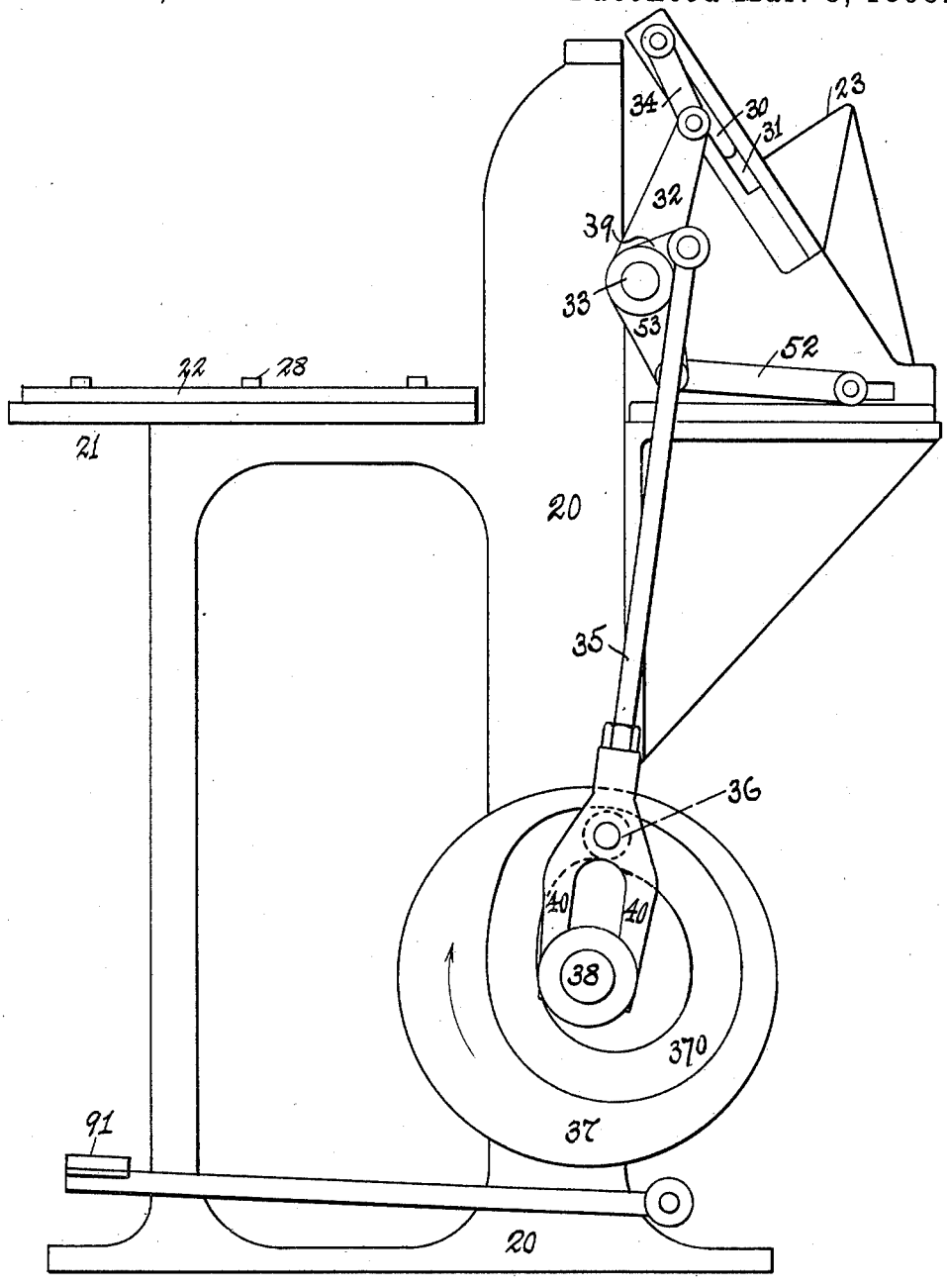
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J. T. MORROW.

MEANS FOR SECURING METALLIC OR OTHER SHEETS TOGETHER.

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Fig. 2.

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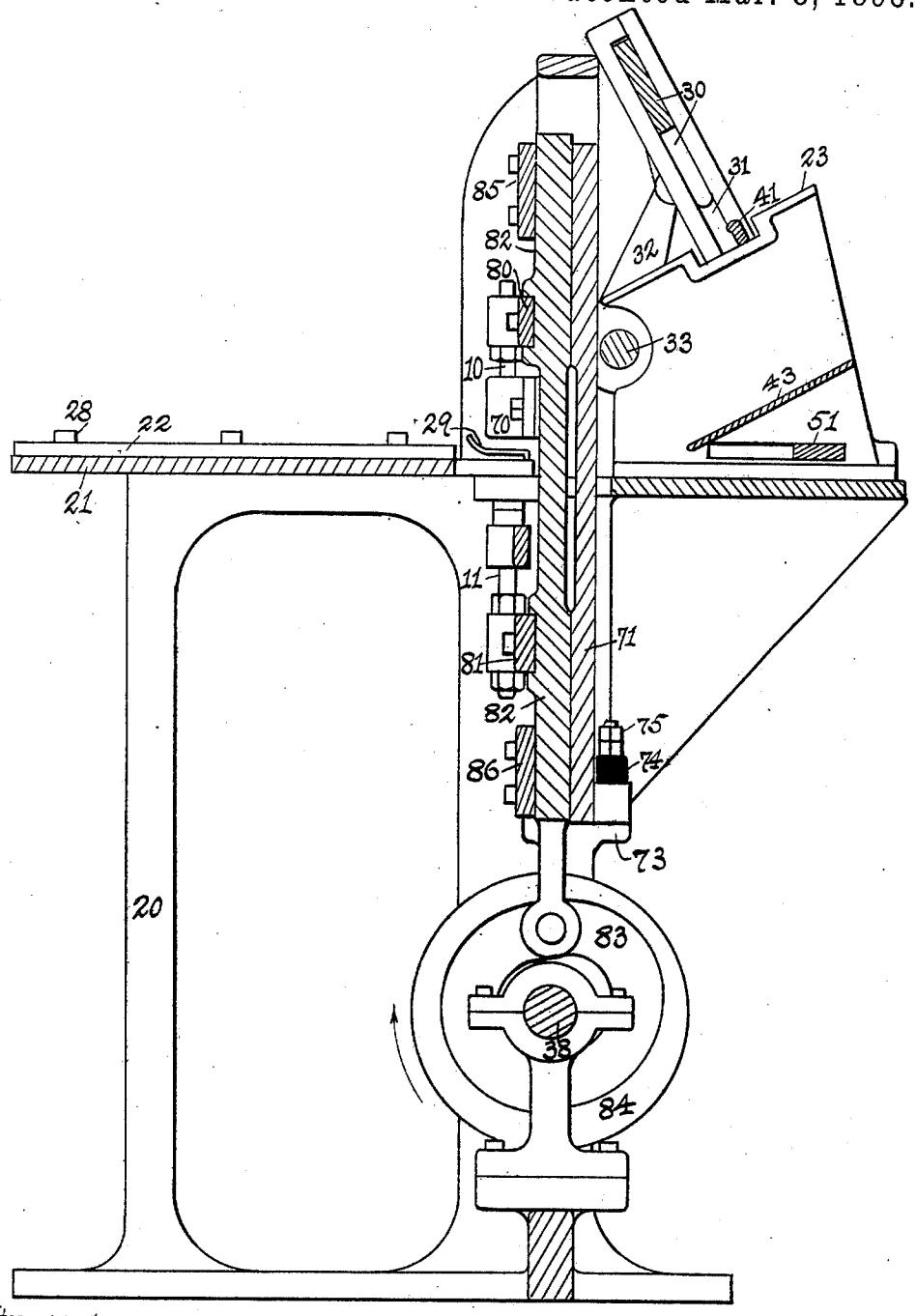
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J. T. MORROW.

MEANS FOR SECURING METALLIC OR OTHER SHEETS TOGETHER.

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Witnesses

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Fig. 3.

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J. T. MORROW.

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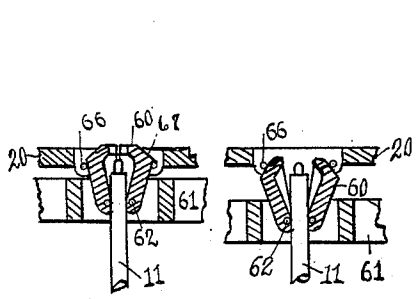


Fig. 8

Fig. 7.

Fig. 4.

Fig. 11.

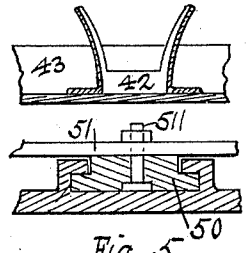


Fig. 5.

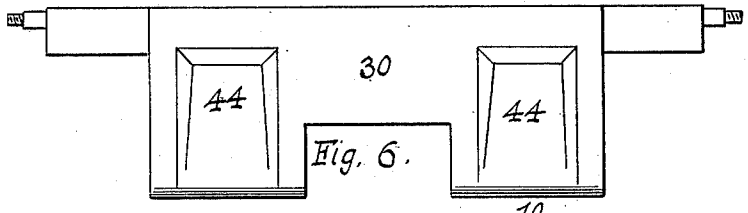


Fig. 6.

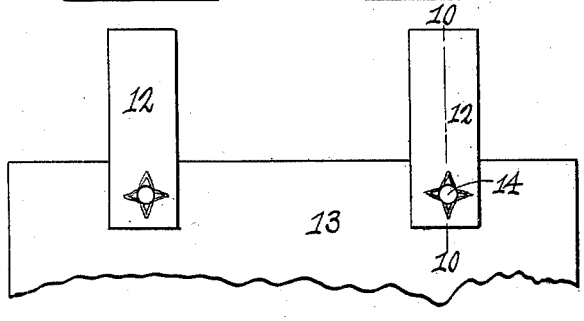


Fig. 9.

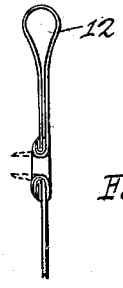


Fig 10

Witnesses

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by Harold Bruce

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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

JOHN T. MORROW, OF GREAT FALLS, MONTANA.

MEANS FOR SECURING METALLIC OR OTHER SHEETS TOGETHER.

SPECIFICATION forming part of Letters Patent No. 600,498, dated March 8, 1898.

Application filed August 26, 1897. Serial No. 649,580. (No model.)

To all whom it may concern:

Be it known that I, JOHN T. MORROW, of Great Falls, Montana, have invented certain new and useful Improvements in Means for Securing Metallic or other Sheets Together, of which the following is a description, referring to the accompanying drawings, which form a part of this specification.

In various arts it is desirable to secure together sheets of various materials—such as paper, cardboard, and various metals. As an instance, in refining copper by electricity thin sheets of pure copper are used as anodes on which to form the deposit. These sheets are conveniently suspended in the bath by means of strips or clips, which are looped over a rod and are secured to the upper end of each sheet, so as to suspend it from the rod. These strips or clips are formed from thin sheet-copper also, and it is common to rivet or otherwise secure the clips to the sheets in some simple way. In the present invention the sheets which form the clips are put in place upon the edge of the larger sheet, and a punch is then driven through the three thicknesses of metal, and the ends, which are turned up by the punch, are then clenched on the under side of the sheets, so as to unite the clips to the large sheet. My machine is intended to effect this operation mechanically, and with a mere modification of strength, weight, and proportions the machine may be adapted to secure together sheets of any material.

The invention may be embodied in a variety of different ways and will be best understood from a description of the machine, which is illustrated in the accompanying drawings and which forms the most approved embodiment of my invention.

In the drawings, Figure 1 is a front elevation of a machine for securing two clips simultaneously to a large sheet of copper, some details being shown in section. Fig. 2 is a side elevation from the right side of Fig. 1. Fig. 3 is a cross-section of Fig. 1 on the plane 3 3, looking toward the left. Fig. 4 is a cross-section of the upper portion of the machine on the plane 4 4 of Fig. 1. looking to the left, this plane being the axial plane of the punching and clenching dies. Fig. 5 is a detail sectional view on the plane 5 5 of Fig. 4. Fig. 6 shows the movable bending-bar. Fig. 7 is a central section through the divided punching-dies when opened, and Fig. 8 is the same when closed. Fig. 9 shows the upper portion of a plate with two clips clenched onto it. Fig. 10 is a cross-section of Fig. 9 on plane 10 10. Fig. 11 is a detail of guiding mechanism.

Throughout the drawings like figures of reference indicate like parts.

The punches for punching the plates that are to be clenched together in the manner indicated in Figs. 9 and 10 are indicated at 10. The movable clenching-tools are indicated at 11. I will first describe the manner in which a punch and a die of this nature may be used by hand, illustrating by Figs. 9 and 10. An understanding of this action will facilitate the description of the machine.

A clip or strip of metal may be cut of sufficient size to form one of the clips 12. (Indicated in Figs. 9 and 10.) After this has been bent over by hand in the shape shown and placed in position upon the edge of the large sheet 13, so that the two ends of the clip lie on opposite sides of the sheet 13, the punch is driven through the three thicknesses of metal at the point 14. In Fig. 9 the metal is viewed from the bur side of the sheet—that is to say, from the side opposite that against which the punch acts. The direction of the action of the punch is indicated in Fig. 10 by the dotted lines, which show the ragged points of metal in the position after the punch has been driven through and withdrawn. The clenching-die is then brought into action from the other side of the metal, acting upon the turned-up points in a reverse direction to the action of the punch, and the points are clenched over and flattened out, as shown in Figs. 9 and 10, locking the clips 12 rigidly to the sheet 13. This is my method of securing the sheets together.

Turning now to the machine, the frame or housing 20 supports the horizontal table 21, upon which the sheets 13 are laid in position to be punched by the two punches 10. The blanks for the clips 12 are cut from sheets and are dropped into the rear of the machine upon the inclined table 23, between suitable guides 24, and against the stop 25. In Fig. 4 the

flat blank 12 is shown in position ready to be bent by the bending-bar 30. This bending-bar 30 is mounted to travel in two guideways 31 at each side of the machine and is guided by the crank-arms 32, turning on the rock-shaft 33, and connected by the links 34 to the two ends of the bending-bar 30. The rock-shaft 33 is vibrated by means of crank-arm 39, connecting-rod 35, and roller 36, which travels in the channel 370 in the cam 37. The cam 37 is mounted upon the main shaft 38 of the machine. A single revolution of the main shaft 38 completes one cycle of the machine. The lower end of the connecting-rod 35 is guided by means of the forked end 40, the two ends of which rest on either side of the shaft 38 and guide rod 35 as it moves to and from the shaft 38. It will be understood from the figures that two of the flat blanks 12 are introduced at the back of the machine simultaneously in two sets of guides 24 and that these two blanks are simultaneously bent by the movement of the bending-bar 30 through the opening in the table 23. I will describe the mechanism for bending one clip. In Fig. 4, in dotted lines, the position of the clip when it is being bent is shown, and at 300 in Fig. 4 the dotted lines indicate the lower limit of motion of the bending-bar 30. The bending of each clip around the bending-bar 30 is facilitated by means of the spring-pressed friction-foot 41, the spring 411 of which may be adjusted by means of the tension-nuts 412. This friction-foot 41 presses one end of the clip into the recess 44 in the bending-bar 30. After the bending-bar has reached the lower limit of its motion and started on its return movement upward the bent clip drops from the bending-bar into the inclined chute or guideway 42, down which it slides and assumes the position shown at 420, ready to be afterward forwarded onto the edges of the sheet 13, which is shown in place in Fig. 4, ready to receive it. It will be understood from this that the chute 42 is directly behind the punch 10 and that the bending and dropping of the clip takes place directly above the chute 42. The feeding forward of each clip is accomplished by the slides or feeders 50, mounted on the transverse bar 51, which is operatively connected at each end by link 52 and crank-arm 53 with the rock-shaft 33, so as to be actuated simultaneously with the bending-bar 30. When the bending-bar descends, the two feeders 50 feed the previously-bent clips forward under the punches while the bending-bar is bending two new clips, and these two new clips fall from the bending-bar into the chutes 42 as soon as the bending-bar begins to move upward and the feeders 50 begin to withdraw backward. Therefore the clips are bent by the bending-bar 30 and drop to the position 420 in the cycle or operation of the machine preceding the cycle in which the same clips are fed in and secured to the sheet 13. As each bent clip is fed forward by its feeder-slide 50 from the position shown at 420 in Fig. 4 a suitably-inclined surface 510 on the cross-bar 51 strikes a dog 540 on lever-arm 54, pivoted at 55, and raises the lever-arm against the action of the spring 56. The other end of this lever 54 is connected, preferably, by a slotted connection with a crank-arm 57, (see Fig. 11,) which turns a pivoted movable guide-finger 58 and causes it to move in the path indicated in dotted lines and press down the upper end of the bent clip shown at 420, so as to insure its passing under the punch 10 and other obstructions. It will be seen that this movement is accomplished when the rear end of the lever 54 at the right hand in Fig. 4 is raised, so as to depress the other end of the lever against the action of the spring 56. This takes place just as or just before each feed-slide 50 begins to advance the bent clip in front of it at the position 420. The position of the clip when fed into the machine is shown at 45 in dotted lines, its two ends lying, respectively, above and below the plate 13 and overlapping the plate 13 directly beneath the punch 10.

I will next describe the introduction of the plate 13 into the machine.

The plate 13 is laid on the table 21 and pressed laterally against the adjustable guide 22, which may be set for the various widths of different plates 13 by means of the bolts 28, which extend through transverse slots in the guide-plate 22, as is clearly shown in Figs. 2, 3, and 4. Guided by the guide 22 the plate 13 is pushed back into the machine until its rear end, passing under the guide-fingers 29, is stopped by the vertical portion of these guide-fingers 29. These guide-fingers 29 may be placed at almost any position along the back of the table 21, clear of the moving parts of the machine. Immediately after the plate 13 has been put in place, the machine started, and each of the two clips fed into the position shown at 45 in Fig. 4 the divided dies 60 rise up to the level of the table 21 and the two presser-feet or holders 70 descend, pressing the two ends of each clip against the respective faces of the plate 13 ready for the punching operation. The mechanism by which this is accomplished will be presently described. Immediately thereafter the punches 10 descend, punching through the three thicknesses of metal and forming the projecting bur, as indicated in dotted lines in Fig. 10, already described. The return movement of the punches 10 causes the clenching-tools 11, which move with the punches 10 upward, to turn down and clench the projecting burs, so as to fasten the clips to the plate, as indicated in Figs. 9 and 10. During this motion the divided dies 60 open to let the clenching-tools 11 pass upward. As soon as the clenching has been effected each clenching-tool 11 drops to the position shown in Fig. 4 and the presser-foot 70 rises, releasing the plate 13, so

it may be drawn from the machine with each of the clips secured, as indicated in Figs. 9 and 10.

I will now describe the means by which these several motions are effected.

It will be seen from the foregoing that punches 10 and clenching-tools 11 move together, that the presser-feet 70 have an independent and differently-timed movement, and that the divided dies 60 have a third independent movement. Consequently, in addition to the cam 37 already described, which actuates the bending and feeding-in mechanism for the clips, I mount upon the main shaft three different cams or pairs of cams for effecting the three different motions just referred to. The split or divided dies 60 are shown in section in Figs. 7 and 8. Each of these divided dies consists of the two parts, as indicated, pivotally secured to the supporting-bar 61 by pivots 62. The bar 61 is connected at either end with the vertical rod 63 and cam-rollers 64, which roll upon the two cams 65, so as to raise and lower the bar 61, and with it the divided dies 60. The cams 65 are so designed and timed that the dies 60 are raised immediately after the machine is started and its cycle begun, and they remain raised until after the punching operation and preferably until just before the clenching-tools 11 begin to rise. In the closed position, as shown in Fig. 8, these dies leave a central opening for the coöperating punches 10; but these openings are not large enough to permit the movements of the clenching-tools 11, and for this reason the dies are constructed to open and close, as well as to rise and fall. It is not essential that they should rise and fall, though by so doing they leave greater freedom for the introduction of the bent clips into place. It is not absolutely essential that they should divide; but if not a sufficiently large central perforation must be provided for each of the clenching-tools 11. The closing of the divided dies 60 is effected by means of the stationary pins 66, of which there is one for each movable die member. These pins 66 bear against the inclined faces 67 of the dies and cause them to be forced together as they are raised by the movement of bar 61. The bar 61 may be guided in its movement by the rods 63, which extend through the movable plate 71, which latter is mounted to have only a vertical motion upon the framing 20, as will be presently described. The presser-feet 70 are bolted to or otherwise mounted on the upper portion of this plate 71, so as to move with it. Properly-timed movement is given to the plate 71 by means of the cams 72 upon the main shaft 38 and the cam-rollers and connections 73, secured to the lower end of the plate 71. The rubber spring 74, which may be adjusted and compressed by the nuts 75, gives a yielding or spring connection between the plates 71 and the driving-cam 72, so that the presser-feet 70 may yield to adapt themselves to different thicknesses of the plates 13 and clips 12. The cams 72 are so timed that the presser-feet 70 are brought down upon the work immediately after the bent clips have been fed into plates beneath them, and they remain holding the work down preferably until the work is complete; but at the end of the operation they rise, releasing the work, so that the plate 13 may be withdrawn with the attached clips. The movable plate 71 may be guided in its vertical reciprocation upon the framework 20 by means of the guide-plates 76.

The punches 10 and clenching-tools 11 are respectively rigidly mounted on the cross-bar supports 80 and 81, which may be bolted to the vertical reciprocating plate 82, carrying a cam-roller at its lower end, which runs into the camway 83 in the cam 84. The section Fig. 3, taken on the plane 3 3 of Fig. 1, looking toward the left, shows this mechanism very clearly. The reciprocating plate 82 may run in and be supported and guided by a central channel or slideway in the plate 71 and may be held therein by means of the movable plates 85 86. The cam 84 is so timed that immediately after the clips have been fed into place and the divided dies 60 brought up against the under side of the work the plate 82 makes a rapid descending followed by a rapid ascending movement, causing the punches 10 to punch through the plates and the clench-tools 11 to clench the bur or projecting points of the metal, as already described.

I have now described each one of the various motions and mechanisms contemplated in my invention in its most preferred form. It will be seen that all the power is derived from the main shaft 38 and that one revolution of this shaft 38 constitutes a complete cycle of the machine.

It will be seen from the drawings that nearly all parts are made adjustable, and I desire particularly to point out the following adjustments: When longer or shorter clips are to be used, this is provided for by adjusting the stop 25 upon the inclined table 23, so as to bring the center of the unbent clip in line with the center of the bending-bar 30. To provide for the greater or less length of the clip as it is fed in beneath the punches 10, the feeder-slides 50 are adjusted relatively to the movable bar 51, which may be accomplished by means of the bolts 511, which extend through slots in the feed-slides 50, as indicated in Fig. 5. Variations in the thickness of the metal to be punched and clenched when greater than the variation which may be readily taken up by the rubber springs 74 is provided for by using longer or shorter rubber springs 74 or inserting or removing washers, so as to withdraw the normal height of the presser-feet 70. The amount of pressure which will be normally produced by the presser-feet 70 is adjusted by means of the nuts 75, already described. The lesser or greater width of the plates 13 is allowed for and the plates properly centered relative to the two punches by

means of the guide 22 and its lateral adjustment, already described. The punches 10 and the clenching-tools 11 may be separately adjusted vertically at will by means of the nuts 101 102 103, and finally the divided die 60 may be adjusted vertically by means of the nuts 601 602.

The shaft 38 may be driven by the band or belt pulley 90, which runs continuously and loosely upon the shaft, but is clutched thereto at will, so as to turn the shaft by depressing the pedal 91 and thereby actuating the controlling-toe 92. This is a well-known form of mechanism, and as it constitutes no essential part of my present invention I neither illustrate nor describe its details. Various forms of clutch may be used, it being preferable that the depressing of the treadle 91 should cause a single cycle of the machine, so that the operator after placing a plate in position depresses the treadle and immediately the machine goes through its cycle and secures the clips 12 onto the plate, at the same time bending and placing two other clips ready for the next cycle, as I have already described.

I do not attempt to enumerate or describe many equivalent devices for the several mechanisms which I have set forth—such, for instance, as using a metal spring interposed at any desired point or metal springs in place of the rubber springs shown in the drawings, or such, for instance, as storing a number of already-bent clips in a magazine and feeding them from the magazine into the machine. In the broader aspect of my invention, as claimed in the following claims, I wish it to be understood that the means for carrying out each of the motions or functions clearly set forth in the foregoing may be varied without departing from the principles and combinations which constitute the essentials of my invention in its broadest application.

I have described my invention in its preferred form, just as it has been embodied in an existing machine, and I now claim as the essential features of the invention the following:

1. In a machine for securing clips to sheets, mechanism for bending the said clips, mechanism for feeding the bent clips to the suitably-placed sheets, mechanism for simultaneously punching the ends of each of the said clips and the sheet to which they are to be affixed, and clenching mechanism, substantially as described.

2. In combination in a machine for securing a clip to a sheet, mechanism for feeding in the said clip, mechanism for simultaneously punching the said clip and the said sheet, and mechanism for clenching over the punched-up ends of the metal, substantially as described.

3. In combination in a machine for securing a clip to a sheet, mechanism for feeding in the said clip, mechanism for simultaneously punching the said clip and the said sheet, and mechanism for clenching the punched-up ends and a driving-shaft and connections for operating all of said mechanism, controllable at will, substantially as set forth.

4. In combination with means for supporting blanks a bending-bar striking and carrying the said blanks between suitable supports to bend the said blanks, and a spring-pressed foot or piece, 31, pressing laterally against the said bending-bar during part of its movement, substantially as set forth.

5. In combination with a support for a blank, the inclined bending-bar, reciprocating through an interval in the said support, and an oppositely-inclined table or chute beneath the said bending-bar receiving and delivering the bent blank by gravity, substantially as set forth.

6. In combination with a support for a blank, the bending-bar, reciprocating through an interval in the said support, and an inclined table or chute beneath the said bending-bar receiving and delivering the bent blank by gravity, and a reciprocating slide or feeder 50 for feeding the said blank when so delivered, substantially as set forth.

7. In combination with means for feeding a bent clip forward, the pivoted finger 58 movable to compress or guide the said clip while being fed and connections for actuating the said movable finger, substantially as described.

8. In combination with a supporting-table 21 for a plate 13, a mechanical punch 10 acting on a portion of the said plate 13 when in place and means for feeding a strap or clip with one of its ends above and the other below the said plate 13 beneath the said punch, substantially as described.

9. In combination with means for supporting a plate and means for delivering a clip, loop, or scrap thereto, a punch 10, acting upon the said plate and the said strap, clip or loop, and a presser-foot 70 moving independently of said punch for securely holding the said plate and the said strap, clip or loop, substantially as described.

10. In combination in a punching and clenching machine, a punch 10, clenching-tool 11, divided die 60, and presser-foot 70 in combination with mechanical connections actuating the punch against the said divided die, and the clenching-tool against the said presser-foot 70, and means for opening the said die 60 to permit the movement of the clenching-tool 11 therethrough, substantially as described.

11. In combination with means for supporting a plate 13, the divided die 60, means for moving the said die 60 toward the said plate 13, a coöperating punch 10, means for actuating the said punch toward the said die 60 to perforate the said plate 13, means for opening the said divided die 60, and a clenching-tool 11, and means for actuating the said clenching-tool 11 in a direction opposite to the direction of the punch 10, when the said die 60 is opened, substantially as described.

12. In combination in a punching and

clenching machine, the main shaft 38 and means for actuating the same, clip-bending and feeding-in mechanism actuated by the rock-shaft 33, and a cam movement and connection for actuating the rock-shaft 33 from the said shaft 38, substantially as described.

13. In combination in a punching and clenching machine, the main shaft 38 and means for actuating the same, clip-bending and feeding-in mechanism actuated by the rock-shaft 33, mechanical connections for actuating the said shaft 33 from the said shaft 38, a punch and a clenching-tool mounted and movable together and actuated from the said shaft 38, and a divided punching-die 60 actuated from the said shaft 38, substantially as set forth.

14. In combination with the main shaft 38, the three movable supports 61, 71 and 82, actuated by three different cams or sets of cams upon the said shaft 38, the divided dies 60 carried and actuated by the said support 61, the presser-foot 70 movable without the said support 71, and punching and clenching tools moving with the said support 82, substantially as described.

15. In combination with a table 21 for supporting a plate 13, a punch 10 and opposing clenching-tool 11, mounted upon and actuated by a common movable support, the movement of the said support in one direction actuating the punch against the said plate, and the reverse movement actuating the clenching-tool against the said plate, substantially as described.

16. In combination with a punch 10, a clenching-tool 11, a divisible die 60 consisting of two pivoted parts between which the said punch and the said clenching-tool move, a movable support to which the said parts of the die 60 are pivoted, and fixed points 66 against which the two parts of the said divided die 60 bear, the movement of the said support for the said divided die, causing the said die to open and close, substantially as described.

In testimony whereof I have hereunto set my hand this 5th day of August, 1897.

JOHN T. MORROW.

Witnesses:

GEO. C. PIWONKA,

HENRY J. PARKS.