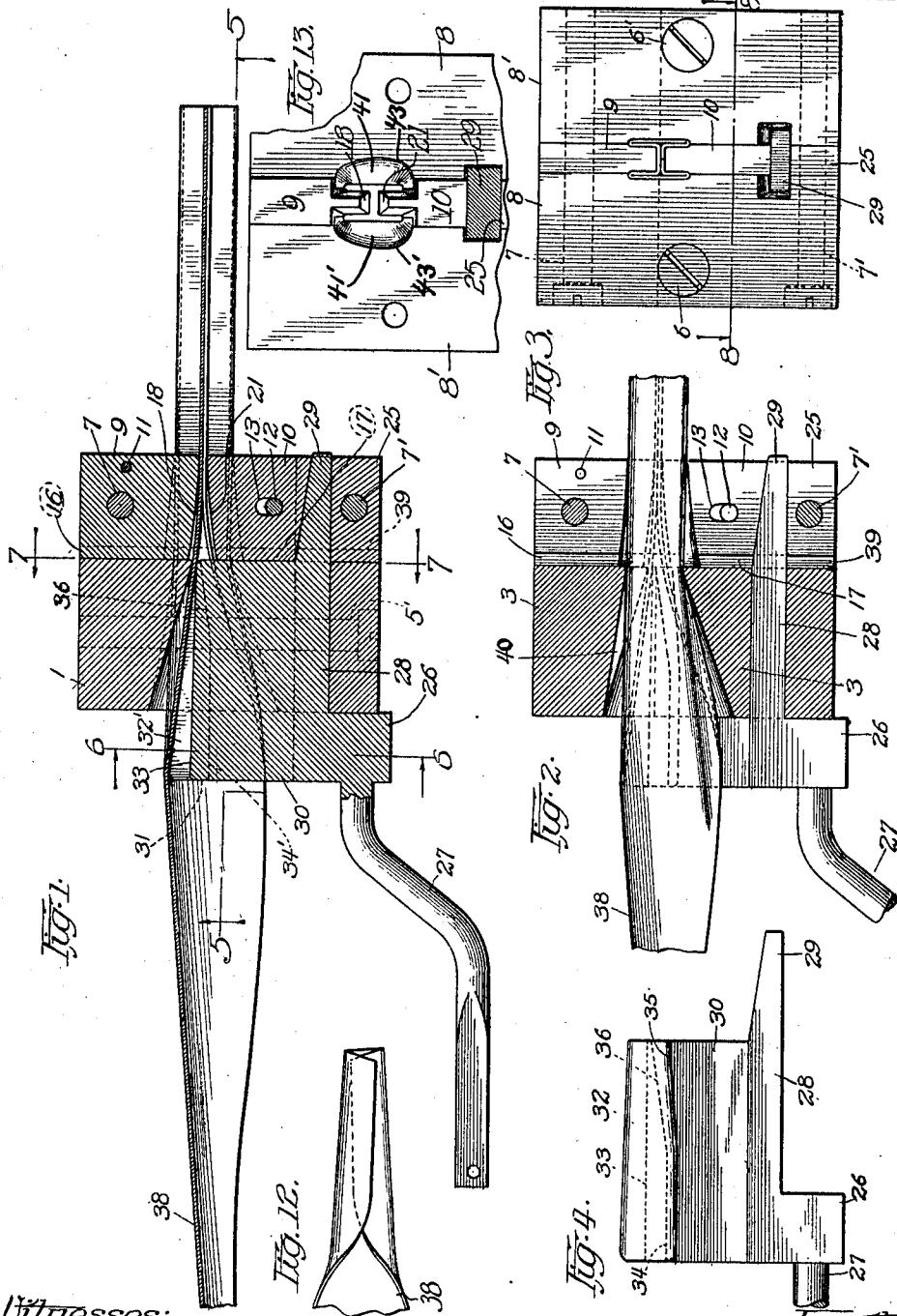


H. RITTER.
METHOD OF MAKING SASH BARS AND DIE FOR FORMING SAME.
APPLICATION FILED JAN. 9, 1911.

1,004,083.

Patented Sept. 26, 1911.

2 SHEETS—SHEET 1.



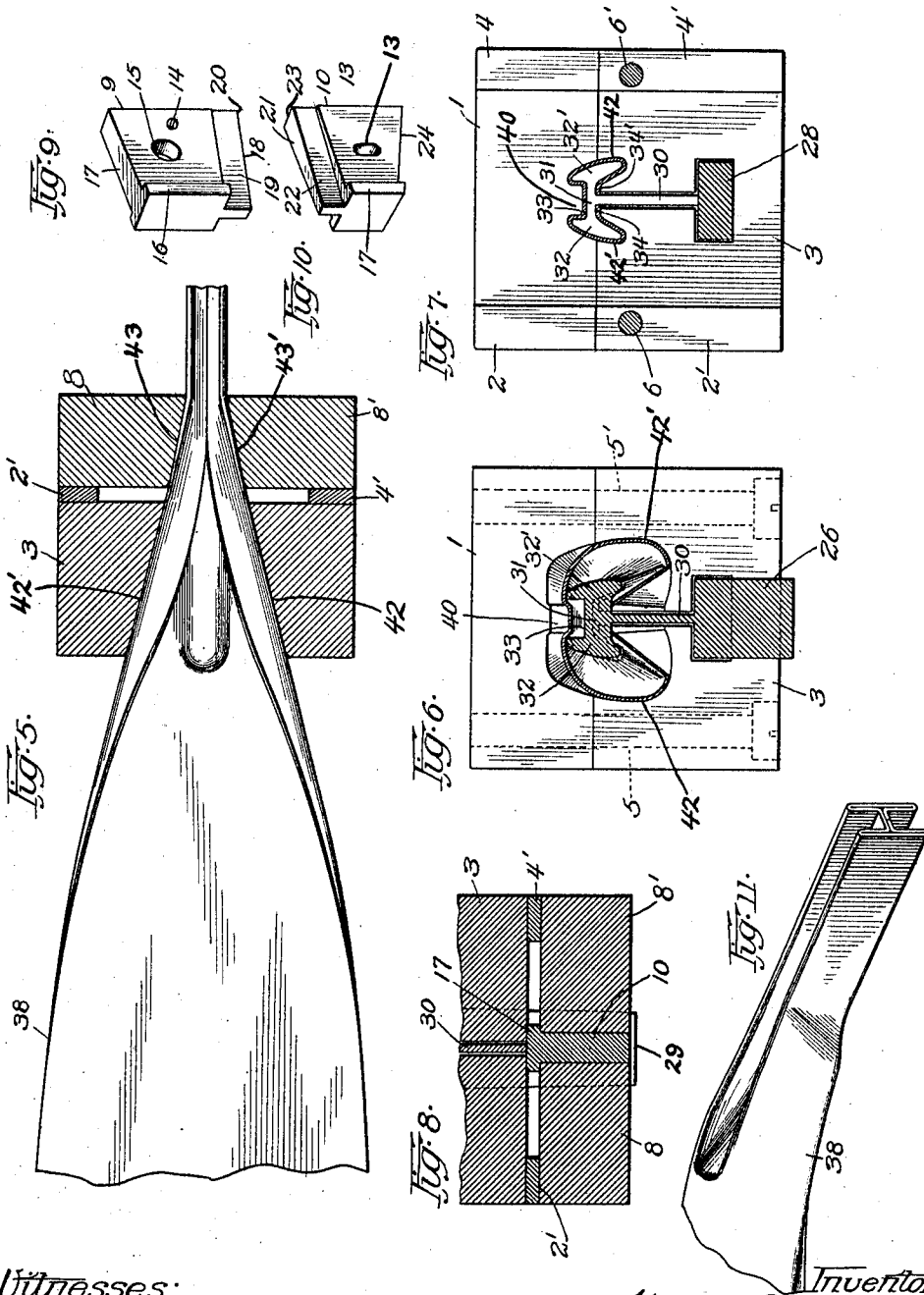
Witnesses:
Robert H. Weir
Harriet M. Peller

Inventor:
Henry Ritter
by
Brown & Hopkins Attys.

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UNITED STATES PATENT OFFICE.

HENRY RITTER, OF CHICAGO, ILLINOIS.

METHOD OF MAKING SASH-BARS AND DIE FOR FORMING SAME.

1,004,083.

Specification of Letters Patent. Patented Sept. 26, 1911.

Application filed January 9, 1911. Serial No. 601,579.

To all whom it may concern:

Be it known that I, HENRY RITTER, a citizen of the United States, and residing in Chicago, in the county of Cook and State of Illinois, have invented a new and useful Method of Making Sash-Bars and Die for Forming Same, of which the following is a specification.

My invention relates to methods and means for forming sash bars and one of its objects is the forming of a sash bar by a single drawing operation.

A further object is the forming of sash bars by a simple, efficient and economical operation.

More particularly, one of the objects of my invention is the forming of a double channel sash bar by a single drawing operation.

Another object of the invention is the formation of a sash bar the metal of which is bent back into close contact on itself by being drawn through a die.

Another object of my invention is the provision of a metal bending die by which the double channel sash bar may be made by one drawing operation through the same.

An additional object of the invention is the provision of a die capable of bending metal back into close contact on itself to form a channel sash bar.

A further object of the invention is the provision in a metal bending die of a movable channeling element permitting the starting operation of bending the metal into the desired form.

A further object of the invention is the provision of a removable core to which is connected a wedge or member for holding the movable element of the die in its operating position.

Other objects of the invention will appear more fully hereinafter, the novel features of the invention being particularly pointed out in the appended claims.

In the accompanying drawings, Figure 1 is a longitudinal and central sectional elevation of the die with the metal in the position it takes while being bent into a double channel, shown in perspective in Fig. 11; Fig. 2 is a longitudinal sectional elevation of the die taken through a plane to show different bending surfaces; Fig. 3 is a front view of the die showing the metal as it appears when bent into its final shape; Fig. 4 is an elevation of the core and holding

wedge connected thereto; Fig. 5 is a horizontal sectional view of Fig. 1 on the line 5—5, looking upwardly in the direction of the arrows and showing a bottom view of the metal as it appears bent by the die; Fig. 6 is a cross-sectional view of Fig. 1 on line 6—6, looking in the direction of the arrows and showing the core in place in connection with the metal being bent; Fig. 7 is a front view of the rear portion of the die, or a cross-sectional view of Fig. 1 on the line 7—7, looking in the direction of the arrows and showing the core and holding wedge in operating position; Fig. 8 is a fragmentary view in horizontal section on the line 8—8 of Fig. 3, looking downwardly in the direction of the arrows, and showing particularly the location of the movable element which is held in final position by the wedge; Fig. 9 is a perspective view of the upper channel bending block; Fig. 10 is a perspective view of the movable element of the die or the lower channel forming block; Fig. 11 is a perspective view of the metal as it appears while being drawn through the die, the right hand end being shown in its finished state; Fig. 12 is a view of the metal showing how it must be bent in order to be able to start the bending operation by drawing the metal through the die; and Fig. 13 is a fragmentary, rear view of the front portion of the die showing the bending surfaces in the same and the upper and lower channel blocks, together with the holding wedge in its operative position.

Referring to Figs. 1, 2, 6 and 7, it will be seen that the entire die is made up of several parts. The rear portion of the die comprises an upper block 1 and a lower block 3, which are rigidly connected together by means of the bolts 5, 5'. Connected to the front surfaces of these blocks are vertical and lateral strips 2, 4, 2', 4', which serve as spacing strips to separate the front portion of the die from the rear portion of the die, and leave the spaces as shown in Figs. 5 and 8. The front portion of the die as shown in Fig. 3 is divided vertically into two blocks 8, 8', which are rigidly connected to the blocks 1 and 3 by means of the bolts 6 and 6'. The blocks 8 and 8' are connected together by means of the bolts 7, 7', but it will be seen that sufficient space is provided between the blocks 8 and 8' for the channel blocks 9 and 10 and the block 25. Each of the blocks 9, 10 and 25 is provided

with guiding surfaces formed by the lateral extensions 16, 17 and 39, each of which is approximately the same thickness as the spacing members 2, 4, 2' and 4'. The rear surfaces of the channel blocks 9 and 10 and the member 25 are flat and fit squarely against the rear surface of the blocks 1 and 3. When the blocks 8 and 8' are secured in position by the bolts 6 and 6', the shoulders formed by the extensions 16, 17 and 39 are engaged by said blocks to hold the channel forming member 9 and the spacing member 25 rigidly in a predetermined position so that the opening at the front surface of the die will be just sufficient to let the double thickness of the metal through. It will also be noticed that the bolts 7 and 7' respectively extend through the channel block 9 and the spacing member 25 which assists in holding the same in proper position. The bolt 7' holds the member 25 from dropping out and also holds the same securely in position so that it will form a proper bearing surface for the wedge 29 when the latter moves the lower channel block 10 upwardly. An additional device for rigidly holding the upper channel member 9 in proper position may be provided by securing a pin 11 rigidly to the inner vertical surface of the block 8' and making it of sufficient length so that it will not only extend through an opening 14 in the channeling member 9 but also extend into a recess in the inner lateral surface of the block 8. By thus making the rear surface of the channeling block 9 flat so that it will fit snugly against the front surface of the block 3 and providing the shoulders 16 and the opening 15 for the bolt 7 and additionally providing the pin 11 to extend through the opening 14, the member 9 is securely held in fixed position so that it will not be moved out of place when considerable pressure is exerted on the channel forming surfaces 18 and 19 during the bending operation while the metal is being drawn through the die.

Although I have shown the rear portion of the die comprising the blocks 1 and 3 as made up of several parts it should be understood that these parts may be made integral, if desired, and the bolts 5 and 5' therefore omitted. The spacing member 25 could also be made integral with either the block 8 or block 8'. The upper channeling member 9 could also be made integral with either the block 8 or block 8' but I prefer to make it removable so that it may be replaced by a duplicate when desired. The lower channeling member 10 is provided with a rear flat surface and lateral shoulders so as to be properly guided in a vertical direction and held in proper position by the blocks 8 and 8'. It should be understood, however, that the blocks 8 and 8' do not fit against the shoulders 17 very tightly as freedom of

movement in a vertical direction of the channeling member 10 is desired. A pin 12 extends laterally from the inner face of the block 8 as indicated in Fig. 1. The channeling member 10 is provided with a short slot 13 which fits over the pin 12. The pin 12 and the slot 13 are principally for the purpose of limiting the upward movement of the channeling member 10 so as to leave just sufficient space between the upper and lower edges of the channeling members to permit only two thicknesses of the metal to emerge from the die at this point. The slot is, however, of such length that when the channeling member 10 is moved to its lower position the space between the channeling members is sufficient to permit three or more thicknesses of the metal to pass through at the starting of the metal bending operation, which will be more fully explained hereinafter.

Both the rear portion and the front portion of the compound die are provided with bending surfaces of peculiar shape so that the metal may be gradually bent and formed into the double channel sash bar, as shown in Fig. 3 or Fig. 11, when brought into cooperation with the directing and bending surfaces of the core 31. The bending surfaces in the blocks 1 and 3 are tapering and converge toward the right as viewed in Figs. 1, 2 and 3. The upper central portion of the opening through the blocks 1 and 3 inclines downwardly toward the right as indicated at 40 in Figs. 2, 6 and 7. By comparing Figs. 6 and 7 with Figs. 1, 2 and 5, it will be seen that the rib 40 acting in conjunction with the groove on the upper side of the core 31 gradually bends the upper channel to almost its full depth, the operation being completed by the upper channel block when the metal passes through the opening in the blocks 8, 8', which is shown in Fig. 13. The central lower portion of the bending surfaces in the block 3 are curved upwardly so as to form additional ribs which converge toward the right to the positions indicated in Fig. 7. Aside from the channeling members 9 and 10 between the blocks 8 and 8' there are formed in the latter, adjacent the inner ends of the members 9 and 10, bending surfaces which are in alinement with the opening in the blocks 1 and 3, shown in Fig. 7. These bending surfaces 41, 41' shown in Fig. 3 converge toward vertical openings of a width equal to double the thickness of the metal to be bent. Therefore when the wedge 29 is driven to its final position, as indicated in Fig. 1, the opening from which the metal can emerge in its final bent shape is that of an H, as shown in Fig. 13, and of just sufficient size to permit two thicknesses of the metal to pass through, as indicated in Fig. 3. As before stated, the bending

surfaces in both portions of the die are tapering or converging in the direction in which the metal is drawn and that the openings through the two portions of the die are in alinement with each other. It should also be observed that the portions of the channel blocks 9 and 10 which project into the opening formed by the bending surfaces 41, and 41', have diverging inclined lateral surfaces and also diverging inclined inner surfaces. The lateral surfaces of the block 9 are indicated at 19 in Fig. 9, and the lateral inclined surfaces of the block 10 are indicated at 22 in Fig. 10. These surfaces are also shown in Fig. 13. The inclined inner surfaces are indicated at 18 and 21 in Figs. 9, 10 and 13.

The core 31 consists of lateral wings 32 and 32' which are elliptical in cross section and inclined toward each other at their upper ends, as indicated at Fig. 7, to form an upper longitudinal groove which is flat on the bottom and has substantially vertical walls. The core 31 is connected by a vertical plate 30 with the guide bar 28. The plate 30 is movable freely through a corresponding opening in the block 3. In this instance this opening extends entirely through the block 3. The guiding bar 28 is rectangular in cross section, as indicated in Fig. 7, and is slidable through a corresponding opening which extends longitudinally through the lower portion of the block 3, as indicated in Fig. 2. The forward end of the bar 28 is provided with an upper inclined surface to form the wedge 29 so that when the bar is inserted into the block to the limit of its movement the channeling member 10 will be moved to its uppermost position, as indicated in Figs. 1, 2, 3 and 13. The forward movement of the bar 28 may be limited by the plate 30 striking against the rear flat surface of the channeling member 10 as shown in Fig. 8, but I prefer to provide the bar 30 with an abutment 26, which strikes against the rear portion of the block 3, when the forward end of the core 31 is substantially flush with the front inner surfaces of the blocks 1 and 3 and in the position indicated in Fig. 7. A handle 27 connected to the abutment 26 may be provided and bent downwardly, as shown, to facilitate the insertion and withdrawal of the core without interfering with the metal extending into the die.

Although the bottom 33 of the upper groove of the core 31 is horizontal and extends in a straight line, I prefer to have the lower grooves formed by the plate 30 and the wings 32, 32', inclined at 36 from the horizontal portion 34. It will also be noticed that the lower edges of the wings are inclined at 35. The rear end of the core 31 as indicated in Fig. 6 is therefore somewhat larger and different in shape than the

forward end of the core, as indicated in Fig. 7.

When the bending operation is started, the metal should first be cut to the proper width so that when bent together in the shape shown in Fig. 3, the lateral edges will not come in contact too soon during the bending operation. Preferably the width of the metal should be such that the edges will come into contact without crowding when the metal emerges and has the shape indicated in Fig. 3. The metal 38 is first bent into the shape shown in Fig. 12. In order to insert the metal through the die so that it can be gripped and drawn, the metal must be bent into at least three layers and therefore the horizontal opening between the channeling members 9 and 10 must be wider than when in the positions shown in Fig. 3. The core with the wedge 29 connected to it is therefore removed from the die when the metal bent as shown in Fig. 12 is inserted. By reason of the slot 13 the lower channeling member may easily be moved downwardly so as to widen the horizontal slot at the front surface of the die. This is an important feature of my invention as it assists materially in enabling metal to be bent into a double channel sash bar by a single drawing through a compound die, thereby saving material and time in producing the results desired. After the metal 38, bent into the shape shown in Fig. 12, has been inserted entirely through the compound die, it may be gripped by the usual devices provided for such purpose and drawn farther through the die while the latter is held rigidly in position. After the metal is gripped and the drawing operation begins, the wedge 29 is inserted into the horizontal opening in the lower portion of the block 3 to bring the core 31 in proper position. The core may be forced part way into position, manually or otherwise, and the friction between the moving metal and the core depended on to move the core to its final position and hold it there while the metal bending operation continues. When the wedge 29 reaches the lower inclined surface of the block 10 the latter is forced upwardly so as to decrease the space between the edges 20 and 23 to a distance substantially equal to twice the thickness of the metal being bent.

Although the bottom 33 of the groove on the upper side of the core 31 is shown in Fig. 1 as horizontal and in a plane slightly above a horizontal plane through the edge 23 it may in some instances coincide therewith and if desired the bottom 33 of the groove may be inclined toward the right.

It will be evident that as the metal is moved through the die the upper portion thereof is gradually bent into a groove by the coöperation of the inclined rib 40 and the upper groove in the core 31. The space

between the inner end of the core 31 and the opening in the blocks 1 and 3 is approximately equal to the thickness of the metal being bent and therefore when the metal emerges from the rear portion of the die it should assume the shape indicated in Fig. 7. Preferably the metal strip 38 should be of such a width that its edges do not crowd against the plate 30 and therefore cause too much friction against the drawing force. As the metal comes in contact with the lateral and lower bending surfaces in the block 3, it is gradually bent into a somewhat circular form as shown in Fig. 6 and the edges of the metal are gradually bent upwardly by the lower ribs cooperating with the grooves 34 and 34' of the core 31 until such edges engage the plate 30 or nearly so. The lower left-hand portion and the lower right-hand portion of the curved bending surface in the block 3 are each in alinement respectively with the corresponding portions of the bending surfaces 41 and 41'. Therefore as the metal emerges from the rear portion of the die, part of it immediately engages the bending surface of the front portion of the die. This is indicated in Fig. 5 where the preferable alinement of the surfaces specified is shown. The alined bending surfaces are shown at 42, 42', 43 and 43' in Figs. 5, 6, 7 and 13. After the metal emerges from the rear portion of the die in the shape shown in Fig. 7, it enters the opening shown in Fig. 13 and engages the bending surfaces. The lateral faces of the metal is gradually changed from its inclined shape shown in Fig. 7 to the vertical positions shown in Fig. 3. The upper grooved portion of the metal engages the inclined surface 18 and the lateral faces 19 of the channeling block 9 and is gradually forced into a deeper or U-shaped section having a horizontal bottom and vertical walls brought into close contact with the lateral or vertical portions of the metal. The edges of the metal strip are separated from each other by the width of the plate 30 when the metal emerges from the rear portion of the die in the shape shown in Fig. 7. These edges then immediately engage the upper inclined surface 21 of the lower channeling block 10 which at this time is held firmly in the position shown in Fig. 2 by the wedge 29. As the curved bending surfaces 41 and 41' crowd the metal against the channeling member 9 to form a deeper channel in the upper portion of the metal the inclined surface 21 forces the edges upwardly while the lateral inclined surfaces 22 assist the bending surfaces 41 and 41' to form the lower channel in the metal strip and crowd the edges of the metal closer together until they are substantially in contact when the metal strip emerges from the die in its finished state, as shown in Fig. 3. When the metal emerges from the die in the

double channel shape, shown in Figs. 3 and 11, with the edges in contact or nearly so, it is straight throughout its length as shown to the right of the die in Fig. 1. It will be seen by referring to Figs. 1 and 2 that the uppermost edges of the double channel are only slightly below the uppermost surface of the metal at the rear end of the core and in some instances the die may be such that the horizontal plane through the upper edges of the completed channel may coincide with the horizontal plane passing through the uppermost point that the metal 38 reaches upon engaging the rear end of the core 31.

Although I have shown a die for bending metal into a double channel for supporting panes of glass and for other purposes, it should be understood that the size and shape of the double channel opening in the front surface of the die may be varied, and so also the details of construction, without departing from the spirit and scope of my invention as defined by the claims. For instance, the upper and lower edges of the double channel may be deflected toward each other so that channels will be formed into which a pane of glass will fit securely and gripped to some extent by the spring action of the metal. This inward deflection will also assure a water-tight fit between the double channel supports and the panes of glass which are cemented into the channel.

Having thus described an embodiment of my invention, what I desire to have secured by Letters Patent of the United States is—

1. In a device of the class described, the combination of a core, and means co-acting with said core for bending metal by a single drawing operation into a double channel.

2. In a metal bending die, the combination with bending surfaces and channeling members, one of said members being movable to permit insertion of a metal strip through the die in the starting operation, of a core for the die, and means for holding the movable channel member in fixed position while the metal is being drawn through the die to bend it into a double channel.

3. In a metal bending device, the combination with blocks having openings provided with metal bending surfaces, of a core, a movable member for varying the size of the exit opening, and a device for holding said movable member in a predetermined position.

4. In a metal bending device, the combination with a die having metal bending surfaces and a movable member to vary the size of the opening through the die, a core for the die, and means for moving said member to operative position.

5. In a metal bending device, the combination with a double channeling die having a movable member to vary the size of the opening through the die, of a core, and

means for moving and holding said movable member in a predetermined position.

6. In a metal forming device, the combination with a compound die, of a core for one portion, the other portion having a movable bending member for varying the size of the opening therethrough, and means connected to said core for holding said movable bending member in operative position.

7. In a metal forming device, the combination with a compound die for bending a strip of metal into a double channel, said die having a movable element for varying the size of the opening through the die, a grooved core, and a wedge for moving and holding said movable element in its final or operative position.

8. In a metal bending device, the combination with a compound die comprising two portions each having converging bending surfaces and one having a movable channeling member, of a core having an upper horizontal groove and a plurality of lower grooves, a guide-bar connected to said core, a handle connected to said guide-bar, and a wedge connected to said guide-bar and associated with said movable channeling member.

9. In a metal bending device, the combination with a block having an opening therethrough with metal bending surfaces converging in the direction in which the metal is drawn and having an upper inclined rib and two lower inclined ribs, of an additional block secured to said first named block and having converging bending surfaces and channeling members, one of said channeling members being movable to vary the size of the exit opening, a core associated with the metal bending surfaces of the first named block, said core having an upper groove, lateral wings approximately elliptical in cross-section and also having lower grooves, a vertical plate extending through said first named block and supporting said core, a guide-bar carrying said vertical plate and also extending through said first named block, a wedge connected to said guide-bar and associated with said movable channeling member to move the latter to its final position and hold it in such position while the metal is being drawn through the die and formed into a double channel, means for limiting the forward movement of the guide-bar, wedge and core, and a device connected to said guide-bar for moving the same into or out of operative position.

10. The method of forming double channel sash bars which consists in bending a strip of metal into a tapered form and inserting the same through a die having a channeling member movable to increase the size of the exit opening and then placing the

core of the die in position and wedging the said movable member to operative position, and applying a pulling force to the emerging bent metal to draw it through the die to effect the finished product by a single drawing operation.

11. In a device of the class described, the combination of a mechanism having bending surfaces, and means coacting therewith for effecting the bending of the material into a double channel by a single drawing operation.

12. In a bending die, the combination of bending surfaces and channeling members, and a core for the die to bend the metal in close contact on itself.

13. In a bending die, the combination of blocks provided with metal bending surfaces, and a core coacting with said metal bending surfaces to effect bending of the metal back in close contact on itself to form a channel.

14. In a metal bending die, the combination of a block having bending surfaces, and a core also having bending surfaces and closing the opening through the block except a space double the thickness of the material to be drawn and bent.

15. In a bending die, the combination of a block having an opening therethrough bounded by metal bending surfaces, and a core extending through said opening but leaving an exit twice the thickness of the metal drawn and of a predetermined shape.

16. In a bending die, the combination with a device having a converging opening therethrough bounded by irregular bending surfaces, and a member coacting with said bending surfaces to crowd the metal back in close contact on itself to form a channel sash.

17. In a bending die, the combination with a device having an opening therethrough bounded by irregular bending surfaces, and a core extending through said opening and forming an emerging opening double channel in shape.

18. In a bending die, the combination with a device having an opening therethrough bounded by bending surfaces, and a core extending through said opening and leaving an exit compelling the material drawn to emerge bent back on itself and in double channel form.

19. In a bending die, the combination of a device having a converging opening therethrough bounded by irregular bending surfaces, and a core extending through such opening and forming with the said device an exit opening compelling the material drawn to be bent back on itself throughout its width to form a sash bar substantially H-shaped in cross-section.

20. The method of forming a channel sash bar which consists in inserting a strip of

metal through an opening in a die having bending surfaces, placing the core in position, and drawing the metal through the die so that the core coacting with the said bending surfaces will bend the metal back in close contact on itself of cross-sectional shape determined by the exit opening formed by the core and said bending surfaces.

21. The method of forming sash bars which consists in inserting the metal through a die having bending surfaces, placing the core in position, and applying a pulling force to the emerging metal to draw it through the die to cause the metal to be bent back on itself into a predetermined shape.

22. The method of forming double channel sash bars consisting in starting a sheet of metal of a predetermined width through the opening of a die having converging bending surfaces, placing the core in position to extend into said opening, and applying a pulling force to the emerging metal to draw it through the die and force said core into position where it forms with the die an exit compelling the metal to be bent back on itself with its edges meeting or nearly so and producing a sash bar substantially H-shaped in cross-section by a single drawing operation.

23. The method of forming double channel sash bars which consists in bending a sheet of metal into irregular form with the edges gradually approaching each other until in contact or nearly so and at the same time gradually flattening out the sides and forming a longitudinal groove where the said edges meet and also a longitudinal groove on the opposite side and finally bend-

ing the metal back on itself throughout its cross-section to form a double channel H-shaped in cross-section.

24. In a metal bending device, the combination of a double channeling die having bending surfaces for directing the metal, and a core co-acting with said bending surfaces to direct the metal into a double channel by a single drawing operation.

25. In a bending die, the combination with a device having an opening therethrough bounded by converging surfaces, and a core extending through said opening and forming an outlet opening substantially double channel in shape.

26. In a bending die, the combination with a device having a converging opening therethrough bounded by bending surfaces, and a member co-acting with said bending surfaces to crowd the metal back in close contact on itself to form a channel sash.

27. In a metal bending die, the combination with a die having converging bending surfaces for gradually bending the edges of the metal toward the center and into close proximity to each other when the metal is being drawn through the die, of a core having channeling surfaces, and channeling members coöperating with said core to form grooves in the metal, to flatten out the sides, and bending the metal back on itself throughout its cross-section.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses, on this 5th day of January, A. D. 1911.

HENRY RITTER.

Witnesses:

CHARLES H. SEEM,
NINA J. HALSNE.