

E. D. BOYCE.
FORMING DIES.

APPLICATION FILED JAN. 21, 1909.

939,468.

Patented Nov. 9, 1909.

2 SHEETS—SHEET 1.

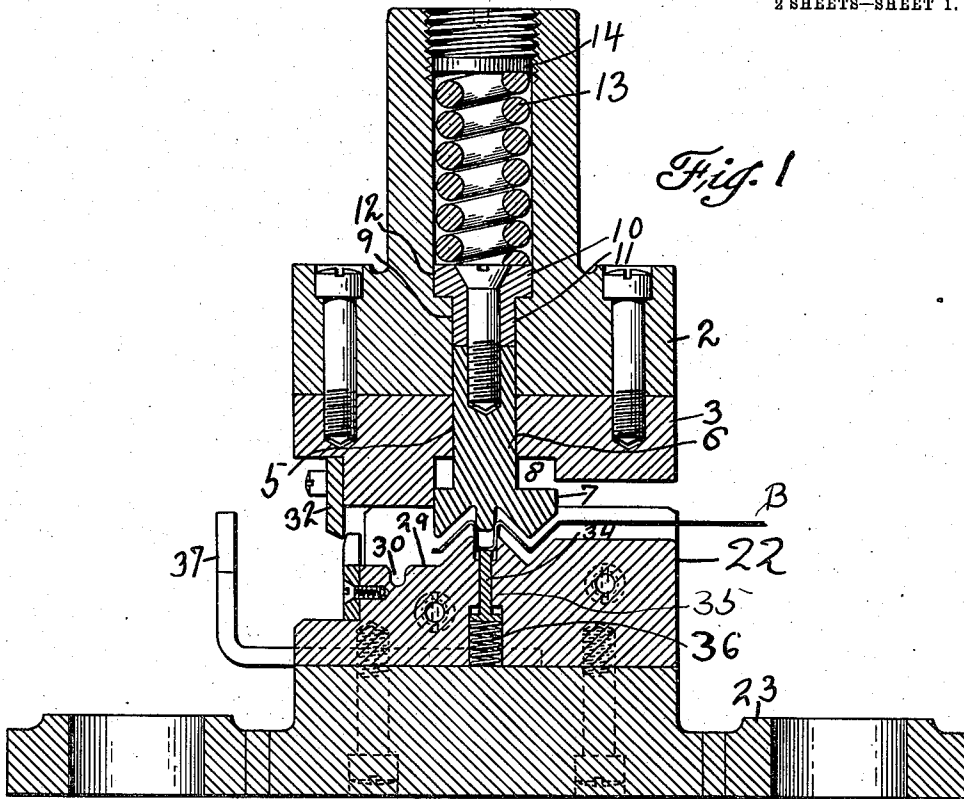
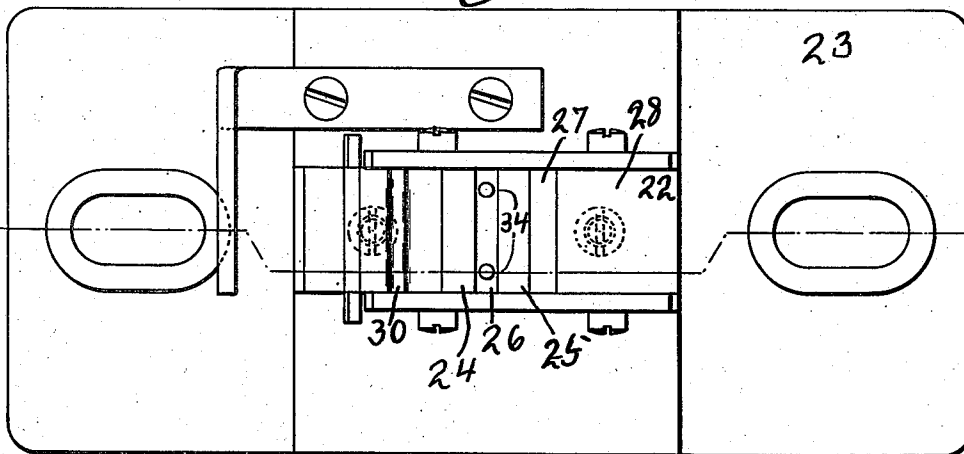


Fig. 2



Witnesses:

B. James.

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Inventor:

Edward D. Boyce

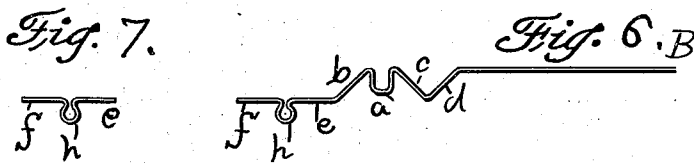
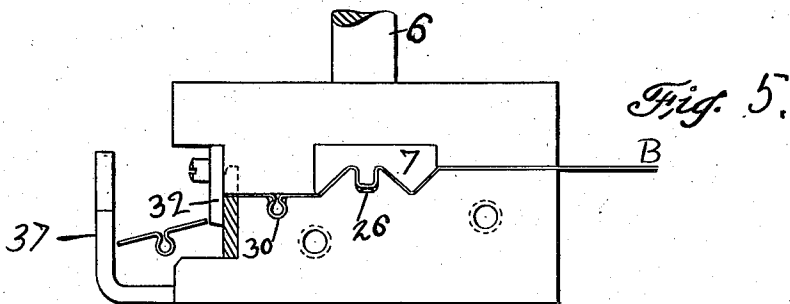
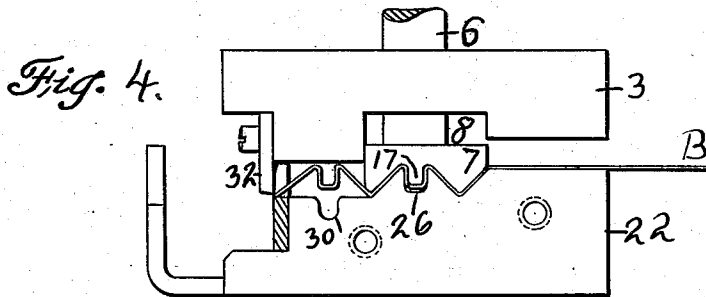
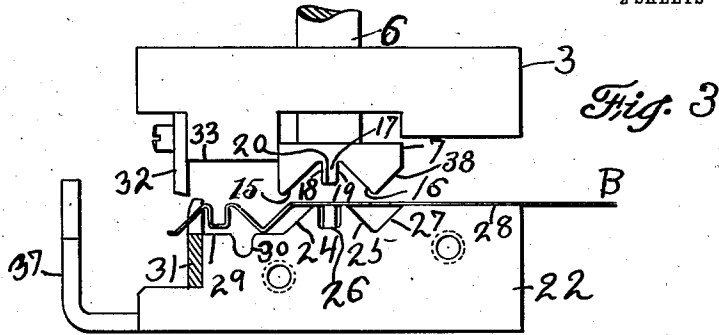
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2 SHEETS—SHEET 2.



Witnesses:
H. J. Smith
W. N. Park

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UNITED STATES PATENT OFFICE.

EDWARD D. BOYCE, OF NEW YORK, N. Y.

FORMING-DIES.

939,468.

Specification of Letters Patent.

Patented Nov. 9, 1909.

Application filed January 21, 1909. Serial No. 473,411.

To all whom it may concern:

Be it known that I, EDWARD D. BOYCE, a citizen of the United States, residing in New York, borough of Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in Forming-Dies, of which the following is a specification.

This invention relates to die mechanism for forming devices in the nature of hinge plates that have a cylindrical bent portion along the middle part.

The object of the invention is to form the bent cylindrical part by bending dies without the use of a rod or pin, around which such parts have been formed heretofore.

In the accompanying drawings, illustrating one embodiment of my invention, Figure 1 is a vertical section of the two die members adapted to be used in a punch press; Fig. 2 is a plan of the lower die member; Figs. 3, 4 and 5 show the two dies in their consecutive positions; Fig. 6 shows the bent strip before cutting off the hinge plate; and Fig. 7 shows the hinge plate.

The upper die is shown as composed of blocks 2 and 3 bolted together; the latter having a hole 5 in which slides a plunger 6 having a head 7 sliding in a socket 8 in the block. The block 2 has a bore 9 in which slides the extension 11 of the plunger, that has a head 10 sliding in the enlarged bore 12 in the block 2. A coil spring 13 is placed in the bore 9 between the head 11 of the plunger and a disk 14 screwed in the threaded end of the bore 9 forces the plunger down, but permits the head 11 of the plunger to recede into the socket when the dies are forced together under great pressure.

The plunger head 7 has a channel portion having inclined faces 15 and 16, and at the bottom of the channel is a tongue 17 having comparatively flat sides 18 and 19 and a flat bottom 20, but with the meeting parts rounded off, as best shown in Fig. 3. The head also has an inclined face 38.

The lower die 22 is secured to the supporting plate 23. This die has a ridge projection, whose sides 24 and 25 are inclined to be engaged by the inclined sides 15 and 16 of the plunger and to press the blank therebetween. At the apex is a channel 26 corresponding in shape to the tongue 17 and in alinement therewith, but wider than the width of the tongue to permit the sheet

metal to be shaped therein. Beyond the ridge on one side is an upwardly inclined face 27 and a flat horizontal face 28. On the opposite side of the ridge is a flat face 29 of less width than the said ridge portion, having a channel 30 at the middle portion. This channel is of less depth than the channel 26, and is of less width and has the bottom rounded off, as shown. The outer part of the face 29 is formed by a cutter piece 31, that is engaged by a knife 32 secured to the die 3 at the edge of a flat pressing face 33, beyond the plunger 7. The channel 26 has one or more plungers, as 34, sliding in a bore 35 and pressed up by a coil spring 36.

When the dies are first moved together, with a blank strip B between them, as indicated in Fig. 1, the plunger being forced down by the spring 13, the tongue 17 will force the metal down into the channel 26, forming the channel *a* shown in Fig. 6, while the inclined faces 15 and 16 will press the metal on each side of the tongue against the ridge faces 24 and 25, forming the inclined faces *b* and *c*, (see Fig. 6), and the inclined faces 38 of the plunger and 27 of the die 22 will form the inclined face *d* of the blank. When the upper die and plunger are raised the plungers 34 force the blank up out of the channel, and the blank is now fed forward until the end strikes the stop piece 37 of the lower die member. But this is only the initial operation. The next descent of the upper die and plunger represents the normal operation of the device, which is as follows:

The bent part *a, b, c, d*, previously formed, (at each operation), lies now between the flat face 33 of the upper die and the flat face 29 of the lower die, that contains the channel 30, and it will be seen from Figs. 3 and 4 that the total width of the bent part *a, b, c* is just equal to that of the face 29 between the inclined face 24 and the outer edge of the cutter plate 31, that is engaged by the knife 32. The parts now being as shown in Fig. 3, the inclined faces 16 and 38 of the plunger head will first engage the strip and then the inclined face 18 will strike the inclined part *d* of the strip B, (see Fig. 6), and force the part *d* against the face 24 of the ridge. But during this movement the tongue 17 is forcing the metal into the channel 26 and the faces 16 and 38 of the plunger are forcing the metal down into the channel formed by the faces 25 and 27. When the plunger is brought down to press the strip against the

lower die, as shown in Fig. 4, the further advance of the upper die 3 will cause the compression of the spring 13 on the plunger, and the plunger head will recede into the socket 8, as indicated in Fig. 5. When the recession of the plunger commences the flat face 33 of the die will strike the top of the faces *b* and *c*, but just before this the knife 32 will engage the cutter plate 31 and sever a previously formed hinge plate. This bent part *a, b, c* will be flattened down as the outer end of the part *b* is engaged by the side of the knife 32, while the attached part of the strip B is clamped between the plunger and the lower die. The downward movement of the face 33 will force the tongue part *a* down into the channel 30 of the lower die. But the inclined faces *b* and *c*, since they cannot spread, will have their inner ends forced together and the tongue or channel *a* will be closed at the top and somewhat rounded at the bottom, as shown in Figs. 5 and 7. When the upper die and plunger are raised, the plungers 34 will force the channel *a* upward, that will also raise the part *e, f, h* out of the channel 30 in the lower die. The strip B is now advanced until the end part *f* strikes the stop piece 37, which will bring the strip in substantially the position shown in Fig. 3, and when the dies again operate the part *e, h, f* will be severed, as indicated in Fig. 5. Thus the hinge plate *e, h, f* is made by two forming dies, without the use of a pin or rod around which it has heretofore been necessary to bend the cylindrical part *h*. At each operation of the two die members a hinge plate is completed and cutoff.

I claim as my invention:

1. The combination of two die members supported to be brought together, one member having a plunger slidable therein with a channel in its lower face having flat sides and also having a tongue at the bottom of the channel, the other die member being provided with a ridge projection with the flat sides corresponding to the sides of the channel and also having a slot at the middle part shaped to receive said tongue, said die member having a flat face adjacent said ridge and a slot extending parallel with said slot, the other die member having a flat face adapted to engage said latter slotted face.

2. The combination of two die members supported to be brought together, one member having a plunger slidable therein with a channel in its lower face having flat sides and also having a tongue at the bottom of the channel, the other die member being provided with a ridge projection with the flat sides corresponding to the sides of the channel and also having a slot at the middle part shaped to receive said tongue, said die member having a flat face adjacent said ridge and a slot extending parallel with said

slot, the other die member having a flat face adapted to engage said latter slotted face, one of said die members having a cutter beyond the flat portion.

3. The combination of two die members supported to be brought together, one member having a plunger slidable therein with a channel in its lower face having flat sides and also having a tongue at the bottom of the channel, the other die member being provided with a ridge projection with the flat sides corresponding to the sides of the channel and also having a slot at the middle part shaped to receive said tongue, said die member having a flat face adjacent said ridge and a slot extending parallel with said slot, the other die member having a flat face adapted to engage said latter slotted face, and means for advancing the plunger in its die member.

4. The combination of two die members supported to be brought together, one member having a plunger slidable therein with a channel in its lower face having flat sides and also having a tongue at the bottom of the channel, the other die member being provided with a ridge projection with the flat sides corresponding to the sides of the channel and also having a slot at the middle part shaped to receive said tongue, said die member having a flat face adjacent said ridge and a slot extending parallel with said slot, the other die member having a flat face adapted to engage said latter slotted face, and a coil spring on the plunger to force it toward the other die member.

5. The combination of two die members supported to be brought together, one member having a plunger slidable therein with a channel in its lower face having flat sides and also having a tongue at the bottom of the channel, the other die member being provided with a ridge projection with the flat sides corresponding to the sides of the channel and also having a slot at the middle part shaped to receive said tongue, said die member having a flat face adjacent said ridge and a slot extending parallel with said slot, the other die member having a flat face adapted to engage said latter slotted face, and a coil spring on the plunger to force it toward the other die member, one of said die members having a cutter beyond the flat portion.

6. The combination of two die members supported to be brought together, one member having a plunger slidable therein with a channel in its lower face having flat sides and also having a tongue at the bottom of the channel, the other die member being provided with a ridge projection with the flat sides corresponding to the sides of the ridge and also having a slot at the middle part shaped to receive said tongue, said die member having a flat face adjacent said

ridge and also having a slot extending parallel with said slot, such die member also having on the opposite side of the ridge portion an extension having an inclined face
5 extending upward and a flat face beyond the same, the other die member having a flat face adapted to engage said latter slotted face.

7. The combination of two die members
10 supported to be brought together, one member having a plunger slidable therein with a channel in its lower face having flat sides and also having a tongue at the bottom of the channel, the other die member being provided with a ridge projection with the sides
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corresponding to the sides of the ridge and also having a slot at the middle part shaped to receive said tongue, said die member having a flat face adjacent said ridge and a slot extending parallel with said slot, said slotted
20 face being of less width than the width of the said ridge projection, the other die member having a flat face adapted to engage said latter slotted face, and a cutter at the outer edge of said cutter face.

EDWARD D. BOYCE.

Witnesses:

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E. N. ROBER.