May 10, 1938. C. W. DAWSON 2,116,670

FORGING APPARATUS

Filed April 21, 1937 2 Sheets-Sheet 1

Fig. 1.

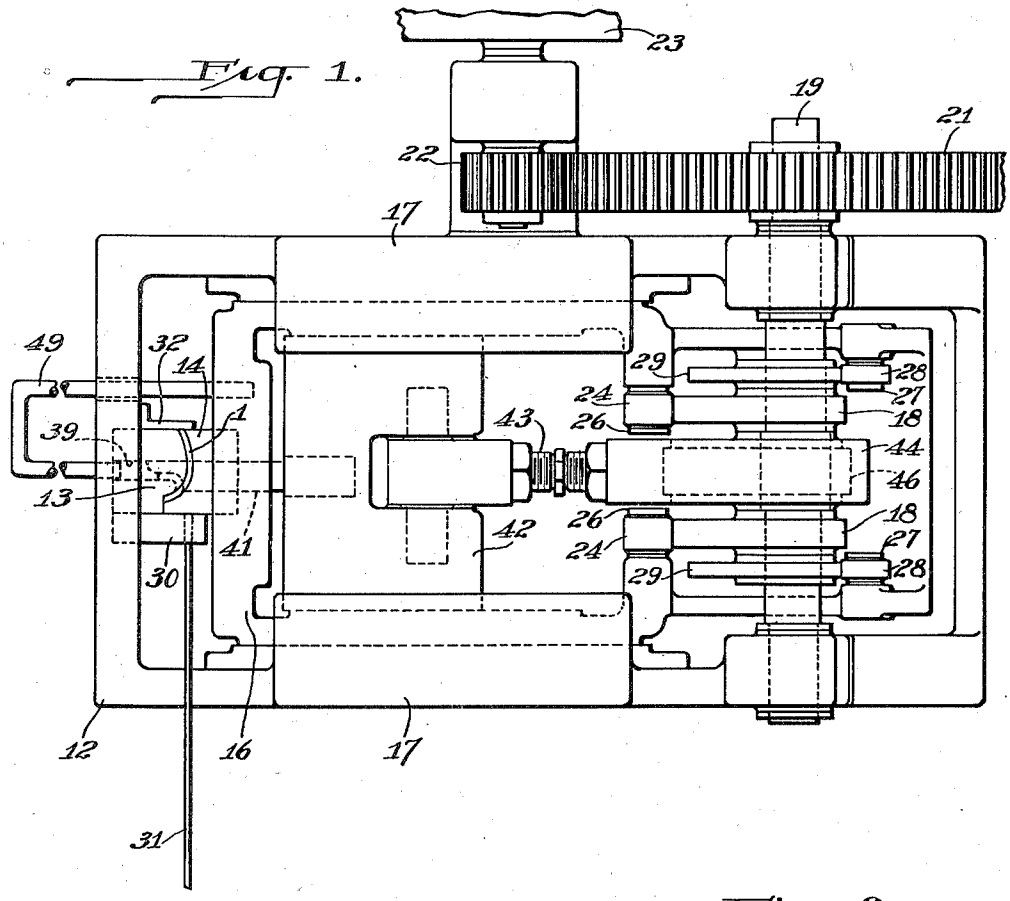


Fig. 2.

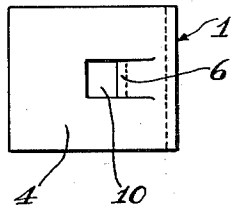
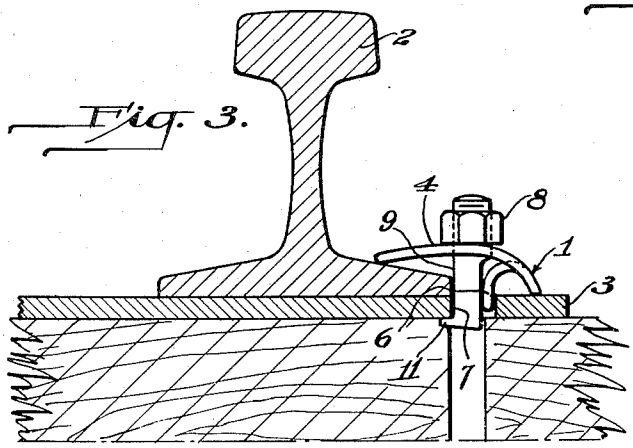


Fig. 3.



WITNESSES
A. B. Wallace.
V. A. Peckham.

INVENTOR.
Charles W. Dawson
BY Brown, Critchlow & Flick
his ATTORNEYS.

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Fig. 4.

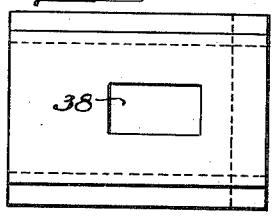


Fig. 5.

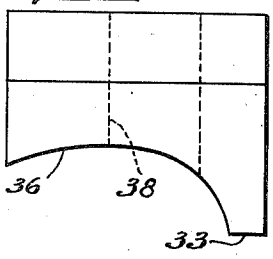


Fig. 6.

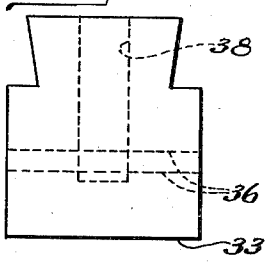


Fig. 10.

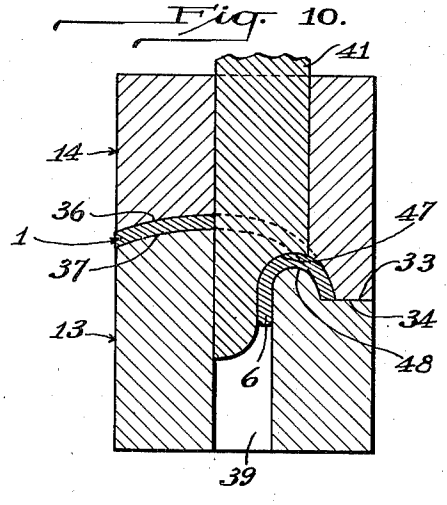


Fig. 7.

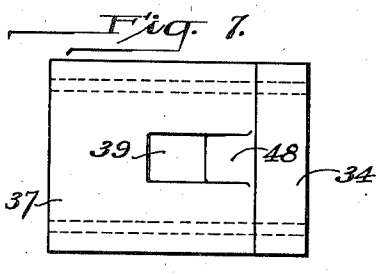


Fig. 8.

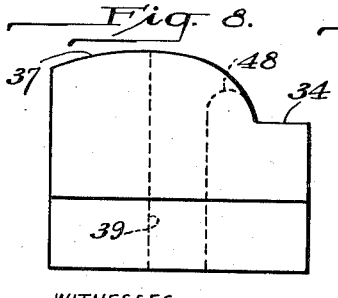
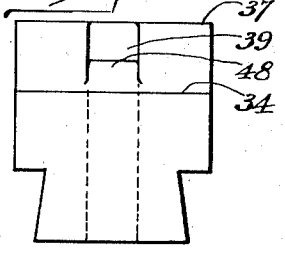


Fig. 9.



WITNESSES
A. B. Wallace.
V. A. Peckham

INVENTOR.
Charles W. Dawson

BY Brown, Critchlow & Flick

ATTORNEYS.

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UNITED STATES PATENT OFFICE

2,116,670

FORGING APPARATUS

Charles W. Dawson, Oakmont, Pa., assignor to Woodings-Verona Tool Works, Verona, Pa., a corporation of Pennsylvania

Application April 21, 1937, Serial No. 138,202

7 Claims. (Cl. 29—34)

This invention relates to apparatus for forging from metal plates rail clips having a curved body whose ends are adapted to engage a rail base flange and a tie plate, and which is provided intermediately with a depending tongue adapted to project into a spike hole in the tie plate.

It is among the objects of this invention to provide forging apparatus by which rail clips of this type are formed in a rapid and economical manner.

The preferred embodiment of the invention is illustrated in the accompanying drawings in which Fig. 1 is a plan view of my forging apparatus; Fig. 2 is a plan view of a rail clip forged by this apparatus; Fig. 3 is a vertical section through a rail and tie showing such a clip in rail-retaining position; Figs. 4, 5 and 6 are plan, side and end views, respectively, of the female die used in this forging apparatus; Figs. 7, 8 and 9 are plan, side and end views, respectively, of the male die; and Fig. 10 is a horizontal section through the dies and a punch showing them in clip-forming position.

According to this invention there are provided a male die and a female die reciprocable relative to each other toward and away from each other. The cooperating opposed faces of the dies are of a contour corresponding to that of the body of a rail clip to be formed from a metal plate disposed between them. The plate is preferably sheared from an elongate blank by a shear blade and a cooperating edge of one of the dies. The two dies are provided with aligned passages extending through their opposed faces and slidably receiving a punch by which a tongue is punched from the plate and bent into the male die passage. Preferably, the male die is provided with a curved surface in the path of part of the punch and over which the tongue is curved by the punch. The relative reciprocable movements of the punch and dies are so timed that the plate is first bent into the shape of a clip body, and then while it is clamped between the dies, the tongue is produced by the punch.

Referring to the drawings, Fig. 2 is a plan view of the type of rail clip 1 which is formed by the apparatus disclosed herein. A side view of this clip and the manner in which it connects a rail 2 to a tie plate 3 are shown in Fig. 3. The clip has a longitudinally curved body 4, the portion of which overlying the rail base flange is but slightly curved while the remaining portion is curved downwardly rather sharply to engage the tie plate. Intermediate its ends the clip is provided with a depending integral tongue 6 that projects into a spike hole 7 in the tie plate. The clip is clamped into position by a nut 8 and bolt 9 extending through the hole 10 formed in the clip by tongue 6. The bolt is reduced in cross section by flattening one side so that it can extend through the tie plate hole beside tongue 6, and its lower end is provided with a lug 11 that projects beneath the tie plate.

In the apparatus for forming this clip, as shown in Fig. 1, a generally rectangular frame 12 is provided at one end with an inwardly extending male die 13 mounted in fixed position. Cooperating with this die is a female die 14 carried by a frame-like carriage 16 reciprocable lengthwise within the frame between guide plates 17 secured to the frame. This carriage is moved toward the male die by means of cams 18 rigidly mounted on a shaft 19 journaled in the rear of the frame and driven through a gear 21 and pinion 22 by a motor 23. The cams engage rollers 24 journaled on stub shafts 26 projecting inwardly from the sides of the carriage. To move the carriage away from the male die its rear portion is provided with inwardly projecting stub shafts 27 on which are journaled rollers 28 that are engaged by a set of cams 29 rigidly mounted on shaft 19. The carriage is thus positively reciprocated by the cams in both directions.

Rigidly mounted in frame 12 at one side of the dies is a combined support and shear blade 30 across which an elongate metal blank 31 is fed to a position between the dies. The amount that the blank can be fed ahead is limited by a stop 32 mounted in the frame at the opposite side of the dies. The edge of the female die adjacent shear blade 30 serves as the movable blade of the shear which cuts a metal plate off from the blank each time the female die is driven toward the male die. Preferably, as best shown in Figs. 5, 8 and 10, the end surface 33 of the female die immediately adjacent its cutting edge is flat and adapted to engage, or substantially engage, a similar flat surface 34 on the opposing face of the male die when the two dies are brought together. At such times the remaining portions 36 and 37 of the opposed faces of the two dies are spaced apart a distance substantially equal to the thickness of the clip formed between them, and have a contour corresponding to that of the body of the clip, as clearly shown in Fig. 10.

It is another feature of this invention that my apparatus is so formed and constructed that as soon as the dies curve a plate into the shape of the body of the clip, tongue 6 is punched from it.

Accordingly, the two dies are provided with aligned passages 38 and 39 extending therethrough and through the central portions of the opposed ends of the dies, as shown in Figs. 4 to 10. Reciprocable in these passages is a punch 41 that is actuated by a cross-head 42 slidably mounted in carriage 16 in carriage guide plates 17. This cross-head is reciprocated lengthwise of the carriage by a link 43 pivoted at one end in the cross-head and provided at its opposite end with a ring 44 encircling drive shaft 19 and an eccentric 46 rigidly mounted thereon. The position of the eccentric is so disposed relative to the cams that the punch is not caused to strike the body of the clip until it is tightly gripped between the two dies, whereby proper punching of the clip is assured.

As shown in Fig. 10, the end portion of the punch is narrowed to about half the width of the remainder of the punch, whereby a shoulder 47 is formed which is preferably arcuate. Likewise, passage 39 in the male die is narrower than female die passage 38 so as to leave a portion in the path of the punch shoulder. This portion has a surface 48 corresponding in contour to that of the shoulder and merging into face 37 so that the punch does not sever the tongue from the body of the clip but merely curves it over surface 48 and bends it down into passage 39.

When the female die and punch are withdrawn from the formed clip, the clip is preferably dislodged from the male die by a U-shape rod 49, one end of which is slidably disposed in male die passage 39 and the other end of which is connected to carriage 16. As the carriage backs away from the male die, the free end of rod 49 strikes the end of tongue 6 and frees the clip from the male die, whereupon the clip drops from between the dies so that blank 31 can be fed forward again until it strikes stop 32. The shearing and forging cycle is then repeated.

With this apparatus the forging operation is automatic and is carried out quickly and in an inexpensive manner. Consequently, the cost of manufacturing the rail clips disclosed herein is low.

According to the provisions of the patent statutes I have explained the principle and mode of operation of my invention and have illustrated and described what I now consider to represent its best embodiment. However, I desire to have it understood that, within the scope of the appended claims, the invention may be practiced otherwise than as specifically illustrated and described.

I claim:

1. Rail clip forging apparatus comprising a male die and a female die adapted to be reciprocated relative to each other towards and away from each other and being provided with cooperating opposed faces corresponding in contour to the body of the clip to be formed from a plate disposed between them, said dies being provided with aligned passages extending through said faces, and a punch reciprocable in said passages and formed for punching a tongue from said plate and bending it into the male die passage.

2. Rail clip forging apparatus comprising a male die and a female die adapted to be reciprocated relative to each other towards and away from each other and being provided with cooperating opposed faces corresponding in contour to the body of the clip to be formed from a plate disposed between them, said dies being provided with aligned passages extending through said faces, a punch reciprocable in said passages and formed for punching a tongue from said plate and bending it into the male die passage, and a portion of the male die being in the path of said punch and having a curved surface over which said tongue is curved by the punch.

3. Rail clip forging apparatus comprising a male die and a female die adapted to be reciprocated relative to each other towards and away from each other and being provided with cooperating opposed faces corresponding in contour to the body of the clip to be formed from a plate disposed between them, said dies being provided with aligned passages extending through said faces, and a punch reciprocable in the female die passage and having a narrowed end portion adapted to enter the male die passage for punching a tongue from said plate and bending it into the male die passage, the punch having a shoulder at the inner end of said narrowed end portion, and a portion of the male die beside said narrowed end portion of the punch and in the path of said shoulder having a surface over which said tongue is bent by the punch.

4. Rail clip forging apparatus comprising a male die and a female die adapted to be reciprocated relative to each other toward and away from each other, a shear blade disposed at one side of the dies, a portion of one of the dies being adapted to cooperate with the shear blade to shear a metal plate fed between the dies, the cooperating opposed faces of the dies corresponding in contour to the body of the clip to be formed from said plate, the dies being provided with aligned passages extending through said faces, and a punch reciprocable in said passages and formed for punching a tongue from the plate and bending it into the male die passage.

5. Rail clip forging apparatus comprising a male die and a female die adapted to be reciprocated relative to each other toward and away from each other, a shear blade disposed at one side of the dies, an edge of one of the dies being adapted to cooperate with the shear blade to shear a metal plate fed between the dies, the cooperating opposed faces of the dies corresponding in contour to the body of the clip to be formed from said plate, the dies being provided with aligned passages extending through said faces, a punch reciprocable in said passages and formed for punching a tongue from the plate and bending it into the male die passage, and a portion of the male die being in the path of said punch and having a surface over which said tongue is bent by the punch.

6. Rail clip forging apparatus comprising a male die and a female die adapted to be reciprocated relative to each other toward and away from each other, a shear blade disposed at one side of the dies, the opposed edge portions of the dies adjacent said blade having substantially flat surfaces adapted to substantially engage each other, one of said edge portions being adapted to cooperate with the shear blade to shear a metal plate fed between the dies, the opposed faces of the male and female dies between said flat surfaces and the opposite side of the dies being longitudinally convex and longitudinally concave, respectively, the dies being provided with aligned passages extending through said faces, and a punch reciprocable in said passages and formed for punching a tongue from said plate and bending it into the male die passage.

7. Rail clip forging apparatus comprising a

male die mounted in fixed position, a female die, means for reciprocating the female die toward and away from the male die, a shear blade mounted beside said dies, the female die having an edge adapted to cooperate with said blade for shearing off a metal plate fed between the dies, the cooperating opposed faces of the dies being curved to correspond in contour to the body of the clip to be formed from said plate, the dies being provided with aligned passages, a punch, means for reciprocating the punch in said passages to punch a tongue from said plate after the dies have forged it into shape, said tongue being bent into the male die passage by the punch, and means reciprocable in the male die passage for engaging the end of said tongue and separating the clip from the male die after the punch and female die are withdrawn.

CHARLES W. DAWSON.