J. H. ALEXANDER & W. J. BRINKMAN.

MACHINE FOR FORMING RAILROAD SPIKES.

APPLICATION FILED AUG. 3, 1910.

997,485. Patented July 11, 1911.

5 SHEETS—SHEET 1.

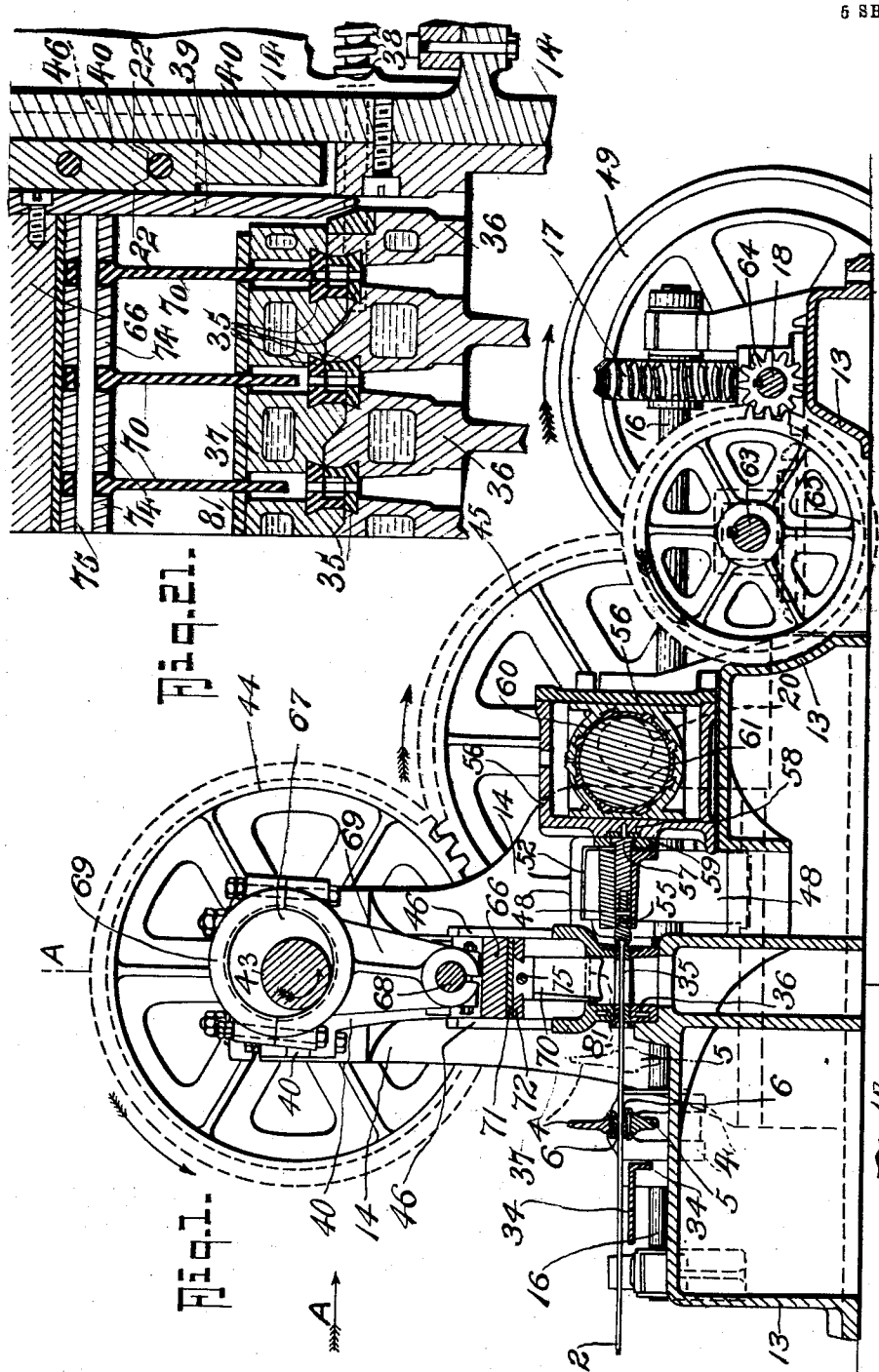

Fig. 2.

Fig. 1.

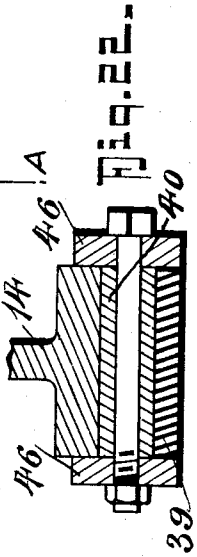

Fig. 2.

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Fig. 2.

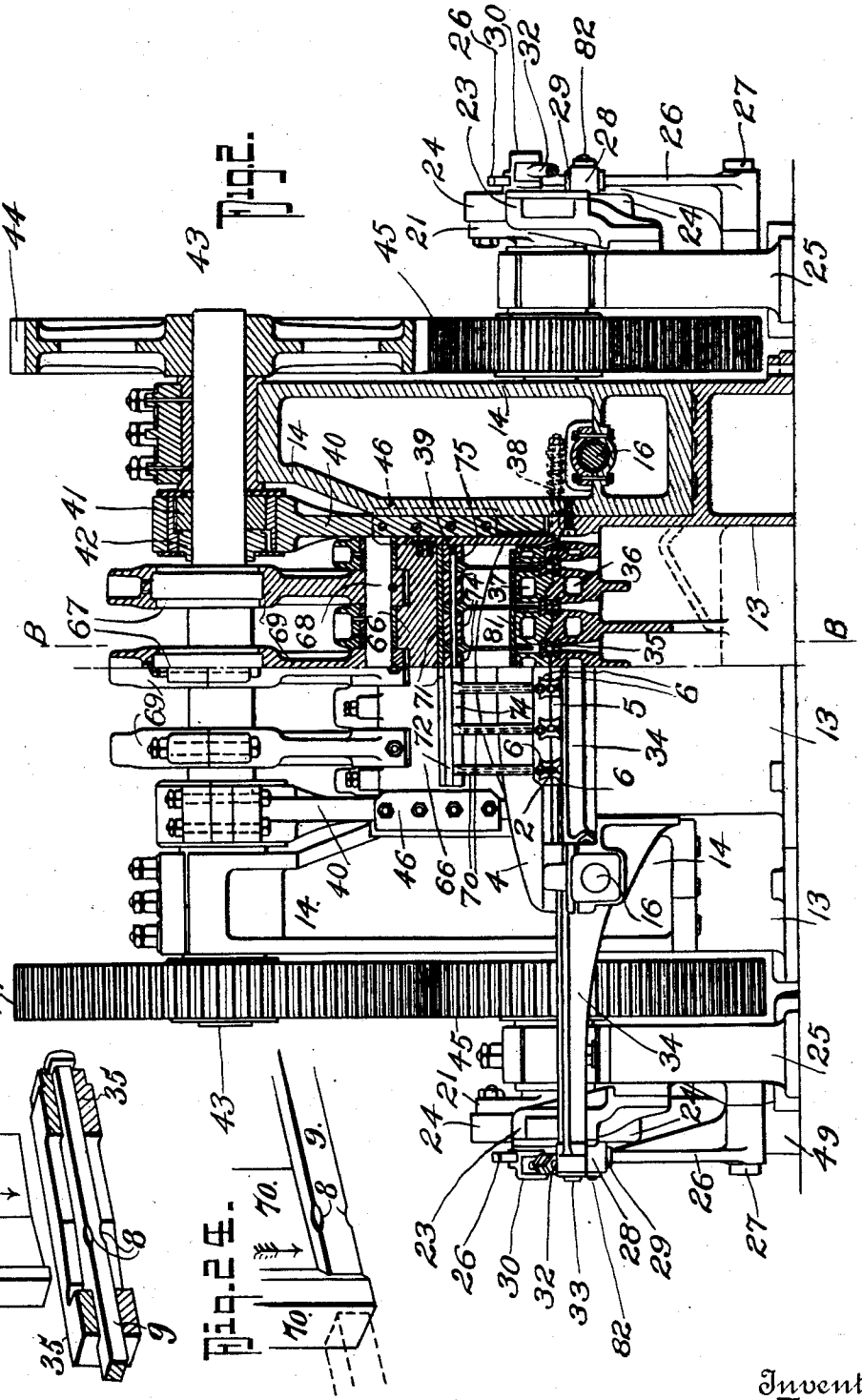

Fig. 2a.

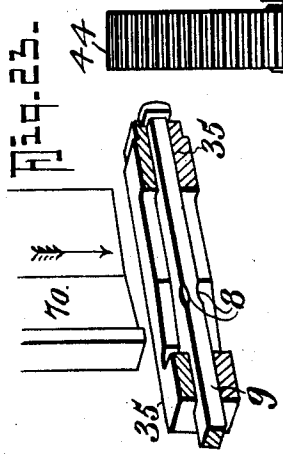

Fig. 2b.

Witnesses

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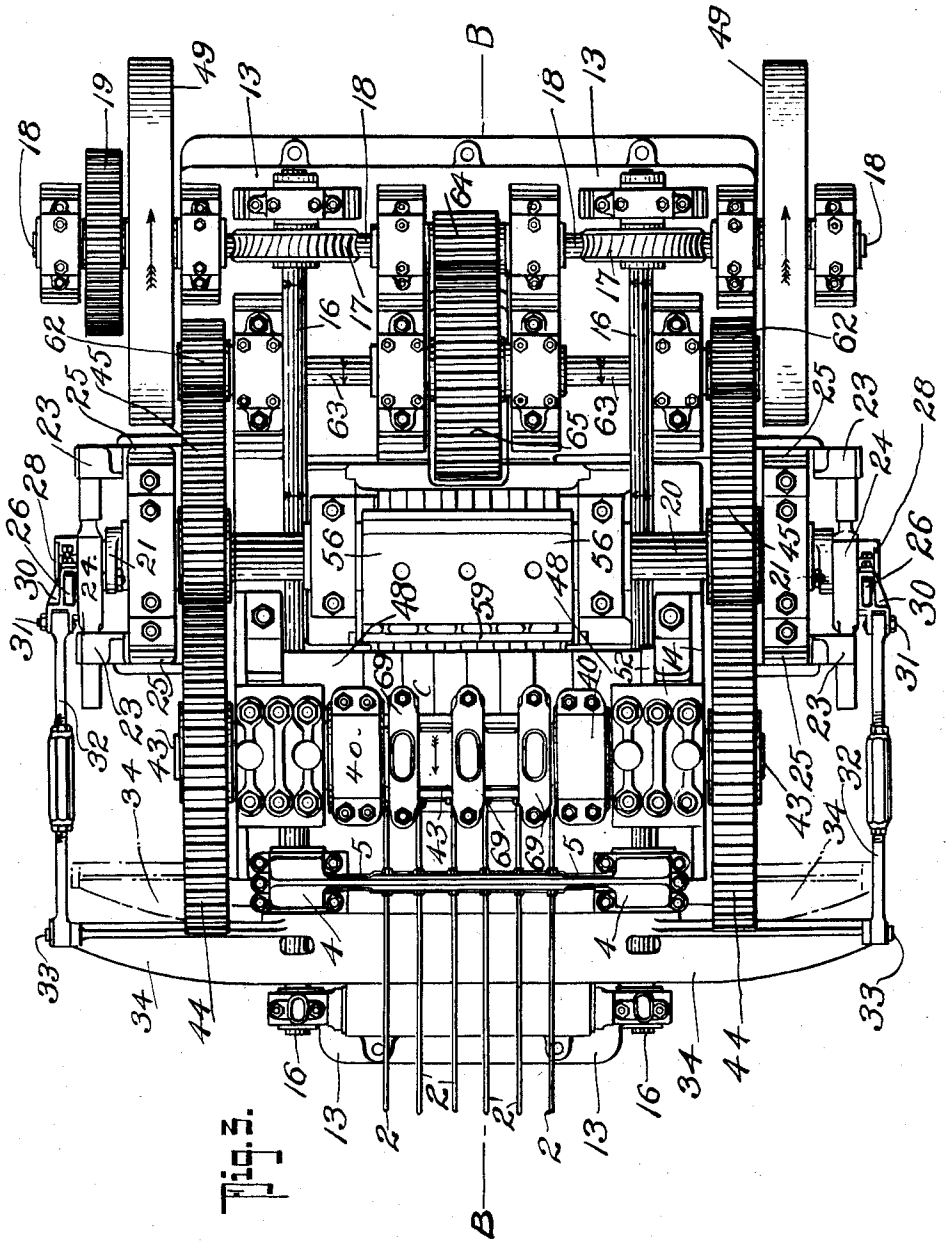

Fig. 3.

Witnesses
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5 SHEETS—SHEET 4.

Fig.8.

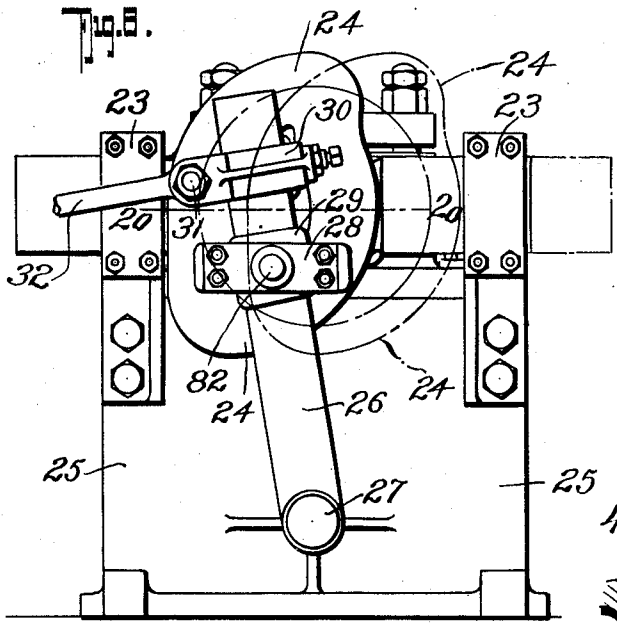


Fig.9.

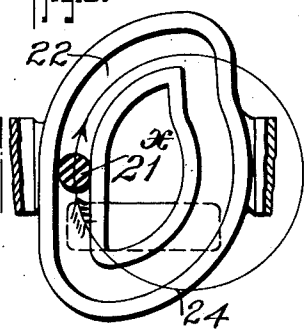


Fig.10.

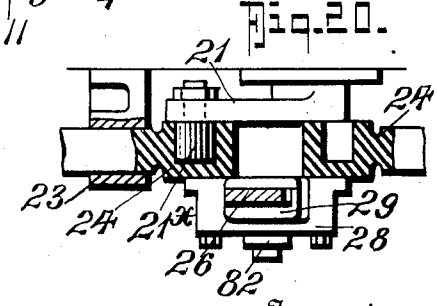


Fig.4.

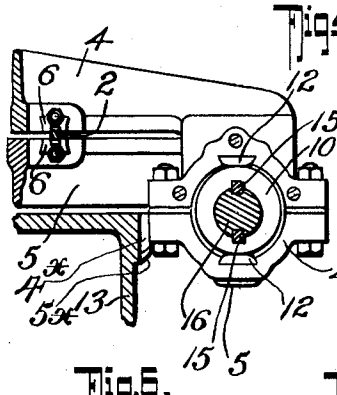


Fig.5.

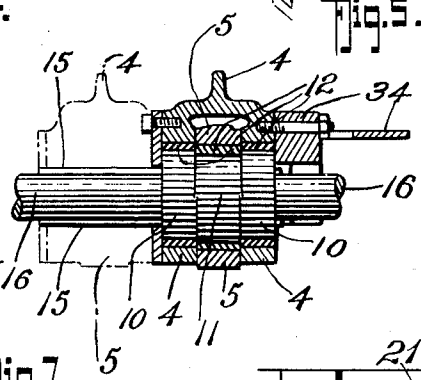


Fig.6.

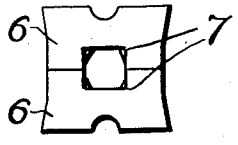
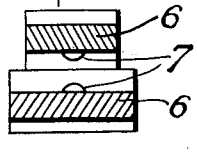


Fig.7.



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5 SHEETS—SHEET 5.

Fig. 10.

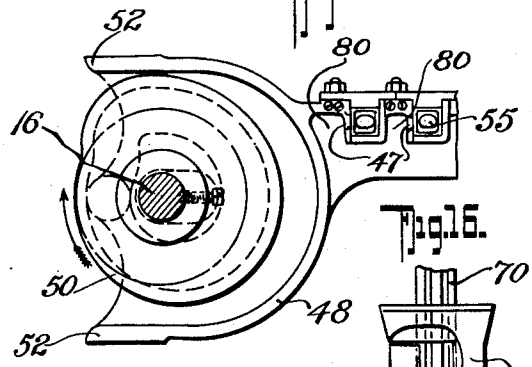


Fig. 11.

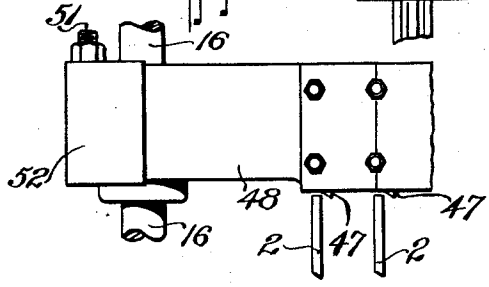


Fig. 12.

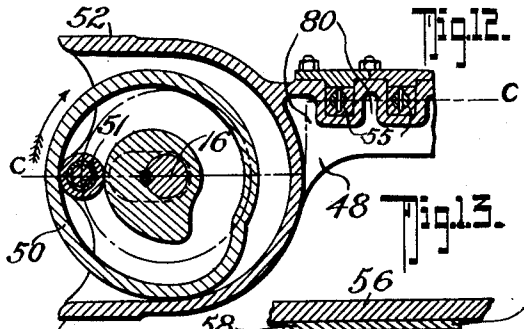


Fig. 13.

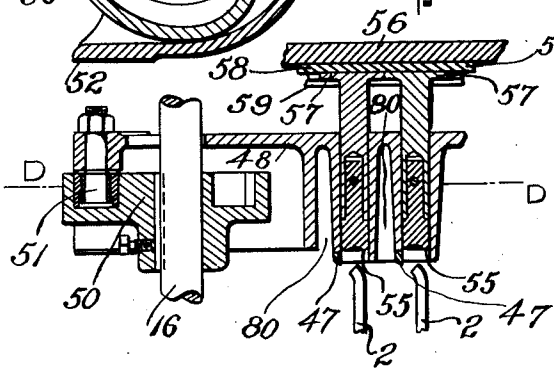


Fig. 14.

Fig. 15.

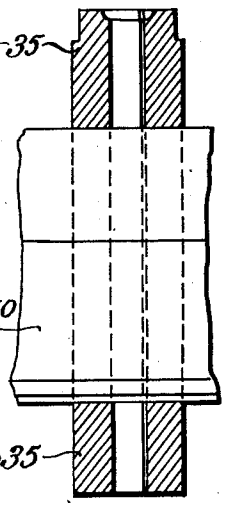


Fig. 16.

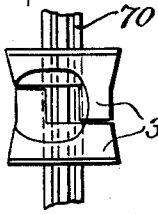


Fig. 17.

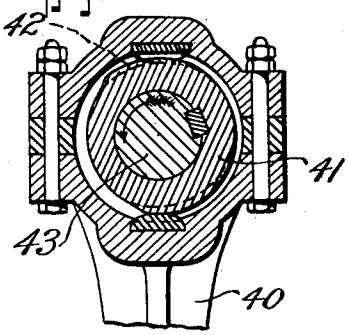
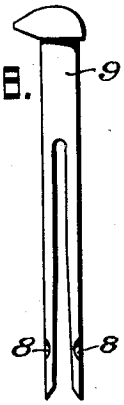


Fig. 18.



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UNITED STATES PATENT OFFICE.

JOHN HYSLOP ALEXANDER AND WILLIAM JOHN BRINKMAN, OF VICTORIA, BRITISH COLUMBIA, CANADA.

MACHINE FOR FORMING RAILROAD-SPIKES.

997,485. Specification of Letters Patent. Patented July 11, 1911.

Application filed August 3, 1910. Serial No. 575,232.

To all whom it may concern:

Be it known that we, JOHN H. ALEXANDER and WILLIAM J. BRINKMAN, citizens of the Dominion of Canada, residing at Victoria, in the Province of British Columbia, Canada, have invented a new and useful Machine for Forming Railroad-Spikes, of which the following is a specification.

This invention relates to a machine for forming bifurcated railway spikes such as illustrated herewith and our object has been to design a machine that will form and cut the spikes simultaneously from heated rods of the required section.

The invention comprises a clamping and feeding device by which the blank bar is drawn from the furnace in which it is heated, and is fed into the holding device in which it is held, and the mechanism whereby the end of the blank is offset to form the head and the spike sheared from the blank in a manner that provides the required bifurcation; also the mechanism whereby the head of the spike is formed on the offset end. The several means by which these various objects are accomplished are fully described in the following specification, reference being made to the drawings by which it is accompanied, in which:

Figure 1 is a longitudinal section through the machine on the line B B in Figs. 2 and 3, Fig. 2 is an end elevation and part section the section being taken on the line A A in Fig. 1 looking in the direction of the arrow A, Fig. 3 is a plan of the machine, Figs. 4 and 5 are enlarged details in end elevation and section of the cams by which the feed clamps are operated to clamp the blank rods, Figs. 6 and 7 are enlarged details of the feed clamp dies, Figs. 8 and 9 are enlarged details of the cams, back and face, and its connections, by which cam the feed movement is imparted to the feed clamp bars, Figs. 10, 11, 12 and 13 are enlarged details of the mechanism by which the blank of the head is offset and the head formed, Figs. 10 and 11 being elevation and plan of the end of the offset frame, and 12 is a sectional elevation of same on the line D D in Fig. 13, and 13 is a sectional plan on the line C C in Fig. 12, Figs. 14, 15 and 16 are enlarged details in plan, sectional and end elevation of the grips in which the blank bar of the spike is held showing the punch which forms the required bifurcation and severs the finished spike from the blank, Fig. 17 is an enlarged detail of the cam whereby the upper grip die block is moved down to grip the blank bar and thereafter lifted therefrom, Fig. 18 is a profile of a spike typical of what the machine is designed to form. Fig. 19, is a detail perspective view hereinafter specifically referred to. Fig. 20, is a section on the line 20—20 of Fig. 8. Fig. 21, is an enlarged sectional view of a part of the machine. Fig. 22, is a section on the line 22—22 of Fig. 21. Figs. 23 and 24 are detail views showing the manner of punching and shearing the bar.

The spikes are formed and cut from the blank bars 2 which are rectangular in cross section and are heated in a furnace or by other suitable means adjacent to the machine.

A spike typical of that which this machine is designed to form is illustrated in Fig. 18 of the drawings which spike it must be understood may be varied in detail. The machine here illustrated is designed to operate simultaneously on six blank bars but this is merely multiplication of the mechanism for one bar which mechanism is hereinafter described. As the blank bars 2 are heated they are seized by feed dies held in upper and lower feed clamp bars 4 and 5 which bars are moved toward one another to secure the blanks. An endwise movement is then imparted to the clamp bars to feed the bars into the other mechanism of the machine. The feed clamp dies 6, see Figs. 4, 6 and 7, are in two pieces the division being horizontal and are removably secured in the bars 4 and 5 in any approved manner. Incidentally they are furnished with corner projections 7 which in the act of clamping on the hot blank form the corner depressions 8 of the spike 9, see Fig. 18.

The ends of the clamp bars 4 and 5 encircle the cams 10 and 11 by which the required vertical movement of the dies 6 to and from one another, to clamp and release the rods 2, is operated, the encircling portion where it contacts with the cams both at top and bottom being provided with dovetailed bearing pieces 12. The clamping bars 4 and 5 have members 4^x and 5^x respectively that slidably engage the machined faces 13^y of the sides of the base frame, (see Figs. 4 and 19). These cams 10 and 11 may be cast in one and are slidably mounted on feathers 15 on a shaft 16 on each side of

the machine which shafts are driven by worm gears 17 from the first motion shaft 18, which is driven through the gear wheel 19 from any convenient source of power external to the machine. The first motion shaft may be furnished with fly wheels 49.

The clamp bars 4 and 5 and the cams by which they are operated are endwise moved to and fro on the shafts 16 and their feathers to feed the clamped blank bars 2 into the machine by means of a crank 21 on each side of a shaft 20 which shaft operates the heading mechanism of the spikes to be described later. To give the required movement of the feed, the pin 21^x of each crank 21 travels in a groove 22 of a cam 24 shaped to give the required rest and movement and this cam is endwise movable in guides 23 secured to a pedestal 25 of the machine frame. To enable the amount of feed movement to be varied the movement of the cams is imparted to levers 26 pivoted at 27 and connected to each cam by a block 29 pivotally mounted at 82 to a keeper 28 secured to the cam, connection to the clamp bars on each side being made by a member 30 endwise adjustable on each lever 26 and provided with a pin 31 to which the rod 32 is connected see Fig. 20. These connecting rods 32, the lengths of which may be varied by a turn-buckle provided on each, are connected to the pin ends 33 of a cross bar 34 which is secured to and projects beyond the ends of the upper clamp bar 4. By this mechanism the feed clamp bars, while open, are moved backwardly in the machine on the blank bars and at the farther limit of their backward movement of the clamp bars are closed one on the other by the eccentric cams 10 and 11. Thereafter the clamp bars through the action of the crank pin in the cam 24, and through the lever 26 are moved forwardly in the machine where after the rods 2 are gripped by the holding dies, in which the blanks are held while the various operations are performed on them, the feed clamp bars 4 and 5 return for another hold. The blank bars 2 being delivered by the feed mechanism to the machine are inserted between and gripped by dies 35. These dies are divided diagonally of the section of the blank bar one closing on the bottom and one side while the other closes against the top and the other side. In length the gripping dies are approximately one quarter longer than the finished length of the spike and are secured in the lower and upper water jacketed blocks 36—37.

The lower die block 36 has a lateral motion only while the upper one has a vertical movement the combination of the two movements securely closing the dies on the blanks 2. The bottom die block 36 is laterally movable in a machined slide of the bed plate 13 of the machine and is normally held in the open position by a coiled spring 38 on a stud screwed into the block and passing through the adjacent side of an upright of the main frame of the machine. The die block is moved laterally against the resistance of this spring 38 to grip the blank 2 by a wedge member 39 secured to and projecting downward from the cross head of the shearing mechanism to be described later which wedge member is inserted between the end of the lower die block and a bearing piece secured to the adjacent frame of the machine. Simultaneously with the lateral movement imparted to the lower die block a downward movement is imparted to the upper one 37 which is at the sides carried up, as at 40, to form a strap which incloses cams 41 and 42 side by side on the shaft 43. This shaft 43 is driven by gears 44 and 45 from the shaft 20 which operates the spike heading die. The separated cams 41 and 42 for the downward pressing and upward lifting of the die block 37 are necessary to obtain the desired timing of the movements see Figs. 21 and 22.

The die block 37 is guided in its vertical movement by plates 46 secured to the upright members 40 and slidable on machined edges of the pedestal 14 which carries the bearings of the shaft 43. The blank bar 2 being securely gripped by the dies 35, the projecting end of it which is designed to form the head of the spike, is offset to one side, as shown in Figs. 11 and 13 in the drawings, by projections 47 secured to a frame 48 which guides the heading dies in their movement to form the head. This offset frame 48 is operated to give the required movement to bring the heading dies into alinement with the spike by a grooved cam 50 on the shaft 16 on each side of the machine, which shaft as before described is driven by worm gearing from the first motion shaft 18. The groove of this cam 50 is engaged by a roller on a pin 51 projecting from the end of the frame 48 which frame is at each end carried around the cam and has sliding bearing surfaces 52 on the top and bottom in the uprights 14 through which it passes. By this mechanism the end of the blank 2 which projects through the gripping dies is laterally offset to form the head and the heading dies are brought into the required alinement to effect the forming of the head which work is performed later in the cycle of movement.

After the offsetting of the head the length necessary to form a spike is sheared from the bar in a manner that will leave the required bifurcated ends. This operation may more properly be described as punching out the interspace of the bifurcation the width of the punch at one end being such that it will cut through the width of the bar and so sever the portion in which the aperture is

punched from the remainder of the bar. The shearing punch 70 by which this work is performed is shown in cross section in Fig. 14. It is slidable through a guide plate 81 in the upper die block 37 and through apertures in the upper and lower gripping dies themselves, as shown in Fig. 15. The punches are secured in and downwardly project from the shearing head 66, which is vertically movable between the upwardly carried sides 40 of the upper grip die block 37, and the guide plates 46 which are secured thereto. The punch cross head 66 is vertically moved by eccentrics 67 formed on the shaft 43 and connected to the cross head pin 68 by eccentric straps 69. The punches 70 are secured in their cross head by dovetailed ends which fit into a corresponding recess formed by a thrust plate 71 and two side strips 72, distance pieces 74 being interposed between the punches, and a through bolt 75 passing through all the punches and their distance pieces. The final stage of the operation is to form the head on the end that was offset while the punching was being effected in preparation for which the movement of offsetting brought the heading dies into proper alinement.

The heading dies 55 are secured to a heading die frame 56 in a manner that will permit lateral movement of the row of die holders on the frame as the offsetting frame moves to offset the end of the spike. This movement of the heading die holders in the heading die frame 56 is permitted by providing each heading die holder with a flanged head 57 which bear against a plate 58 in the heading die frame and are slidably retained thereon by side strips 59 which engage the upper and lower edges of their flanges. The heading die frame is box shaped in cross section and the bottom rests upon a machined slideway on the bed of the machine and in the hollow of the frame which is machined to receive it fits the bearing box 60 of an eccentric 61 formed on the central part of the shaft 20. This shaft is driven by a pinion 62 on an intermediate shaft 63 driven from the first motion shaft 18 by gears 64, 65. The heading dies 55 are thus moved forward by the eccentric 61 to form the head of the spike.

Although the several operations of feeding, gripping, offsetting, punching and forming the heads has been lengthy to describe the cycle of their movement is rapidly performed. The clamping bars 4 and 5 recede from the machine and are closed together to secure a hold of the several blank bars 2 which have been heated to the required temperature. The blanks are then drawn forward and their ends are inserted in and passed through the open gripping dies 35 which immediately close upon them by an effective vertical and lateral movement thus securing a hold on all four sides of the blanks. The offsetting frame 48 moves laterally to offset the projecting ends on which the heads are to be performed and simultaneously the shearing punches 70 are forced down and through the gripping dies and the contained spike, forming the required bifurcation and shearing the spikes from the blank bars. This operation of punching it will be noted is not effected on all the spikes at once as the lengths of the punches are stepped so that the shock of first entering the metal of the spikes does not come on the machine all at once. See Fig. 21. After the punch is withdrawn the heading dies are forced forward and form the heads on the previously offset ends. As the heading dies recede the offsetting frame moves laterally to the position ready for the next delivery of spike blanks, in which position the heads of the finished spike are opposite to the interspaces 80 between the heading die guides, so that the next incoming blank will force out the finished spikes and they fall through the base of the machine where they may be diverted onto a conveyer for delivery therefrom.

Having now particularly described our invention and the various operations performed in the attainment of the desired result, we hereby declare that what we claim as new and desire to be protected in by Letters Patent, is:

1. In a machine for forming bifurcated railway spikes, the combination with means for punching the bifurcations and heading the spike, a feeding means by which the blank bars are delivered to the punching and heading means, of grips which hold all four sides of the bar while the operation of punching the bifurcation and forming the spike head is performed.

2. In a machine for forming bifurcated railway spikes, the combination with a feeding means, of means for gripping the bar from which the spikes are to be made while the work is being done on them, said means including an upper and lower die block, means for imparting vertical movement to said upper die block, means for imparting lateral movement to said lower die block, a die carried by said lower die block and formed to hold the bottom and one side of the bar, a die carried by the upper die block and formed to hold the top and the other side of the bar, substantially as shown and described.

3. In a machine for forming bifurcated railway spikes, the combination with a means for feeding to the machine the blank bar from which the spikes are to be made, of a gripping means for holding the spike blank while the several operations are performed on it, a shearing punch which forms the bifurcations and severs the spike from

the blank, said gripping means having an aperture through which said shearing punch is movable.

4. In a machine for forming bifurcated railway spikes, the combination with a means for feeding to the machine the blank bars from which the spikes are to be made, of a lower die block the half die of which will grip one side and the bottom of the spike bar said lower die block being laterally movable, an upper die block the half die of which is designed to grip the top and the other side of the blank bar, means for offsetting an end of the blank to the side on which the spike head is to be formed, means for severing the spike length from the blank bar said means comprising a punch slidable through apertures in the upper and lower die blocks when the same are closed on the spike, and means coöperative with said die blocks for forming a head on the offset end.

5. In a machine for forming bifurcated railway spikes, feed clamp bars having means for clamping and releasing between them the blank bars from which the spikes are to be made, means for slidably moving these clamp bars forwardly and backwardly in the machine, means for holding the bars while the feeding means is receding, means for laterally offsetting the ends of the bars projected through the holding means, means for punching the bifurcation in each bar and for severing the spike from the blank, and means for forming the head on the offset end.

6. In a machine for forming bifurcated railway spikes, the combination with a feeding means by which the blank bars are fed into the machine and a holding means by which that portion to be operated on is held during the operation, of means for forming the head of the spike, said means comprising a guide frame within which the head forming dies are slidably movable said guide frame being endwise movable in front of the row of spike rods, projections on this guide frame that will engage the projecting ends of the spike rod and offset them toward one side in which movement the heading dies are brought into alinement to form the head on the offset ends of the spike rods, means for moving forward the heading dies to form the heads of the spikes and for returning them thereafter, there being an interspace between each heading die guide in the guide bar into which the finished spike may be projected, means for returning the head dies to the position where the spikes will be opposite to the interspaces.

7. In a machine for forming bifurcated railway spikes, said machine comprising means for feeding a series of blank bars from which the spikes are to be made into the machine in definite but adjustable lengths, means for holding the fed bars during the operation to be performed on them, means for offsetting the ends on which the heads are to be formed and for simultaneously punching the bifurcation of the spike in a manner that will sever it from the blank rod, means for withdrawing the punch and means for forming the head on the offset ends, means for laterally moving the head forming die from alinement with the spike whereby the next fed blank will project the finished spike from the machine.

8. In a machine for forming bifurcated railway spikes, the combination with a mechanism for holding the blank, punching the bifurcation and forming the head of the spike, feed clamps for feeding the blanks to the machine the dies of which clamps include members to impress the metal with corner flutes or other external deformation required in the body of the spike.

9. In a machine for forming bifurcated railway spikes, the combination with a feeding means and means for punching and heading the spike blank, of a holding means for the blank while the punching and heading operations are performed said holding means comprising upper and lower dies the movement of which secure a hold on all four sides of the metal blank by a pressure applied normal to the sides of the blank, means for moving said dies laterally with relation to one another and means for relatively moving said dies in a direction at right angles to said last named moving means.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

JOHN HYSLOP ALEXANDER.
WILLIAM JOHN BRINKMAN.

Witnesses:
J. S. Floyd,
Albert F. Griffiths.