E. J. GUEUTAL.

FORMING MACHINE FOR LEAF SPRINGS.

APPLICATION FILED SEPT. 16, 1918.

1,293,760.

Patented Feb. 11, 1919.

4 SHEETS—SHEET 1.

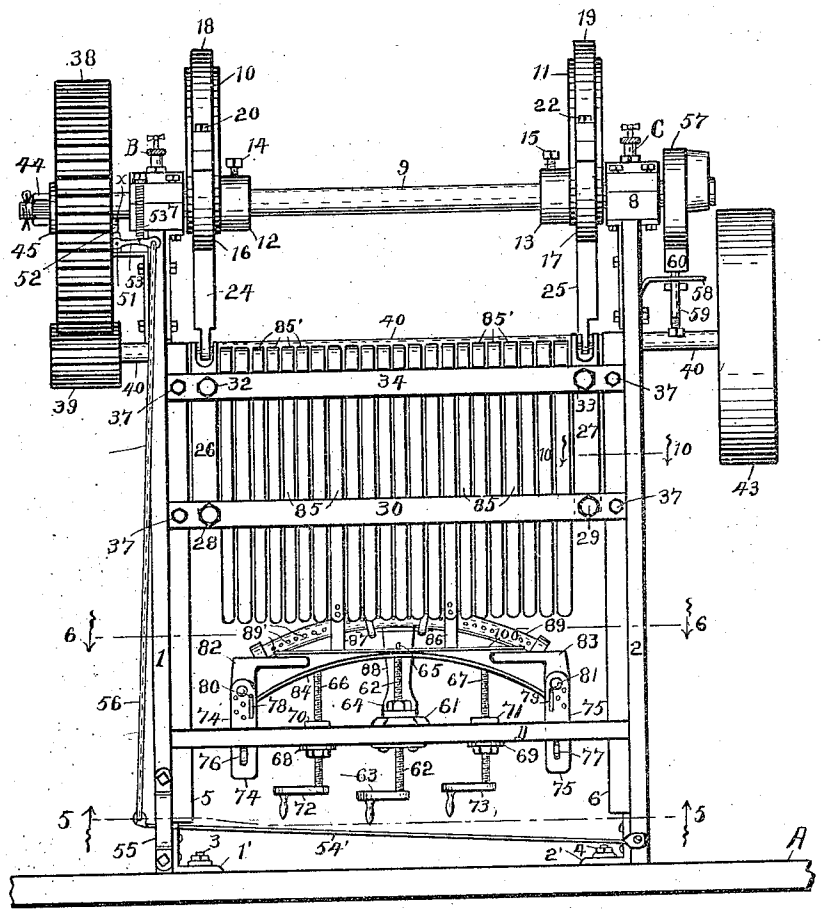


Fig. 1.

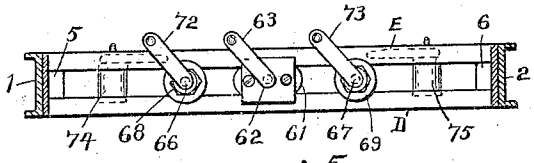


Fig. 5.

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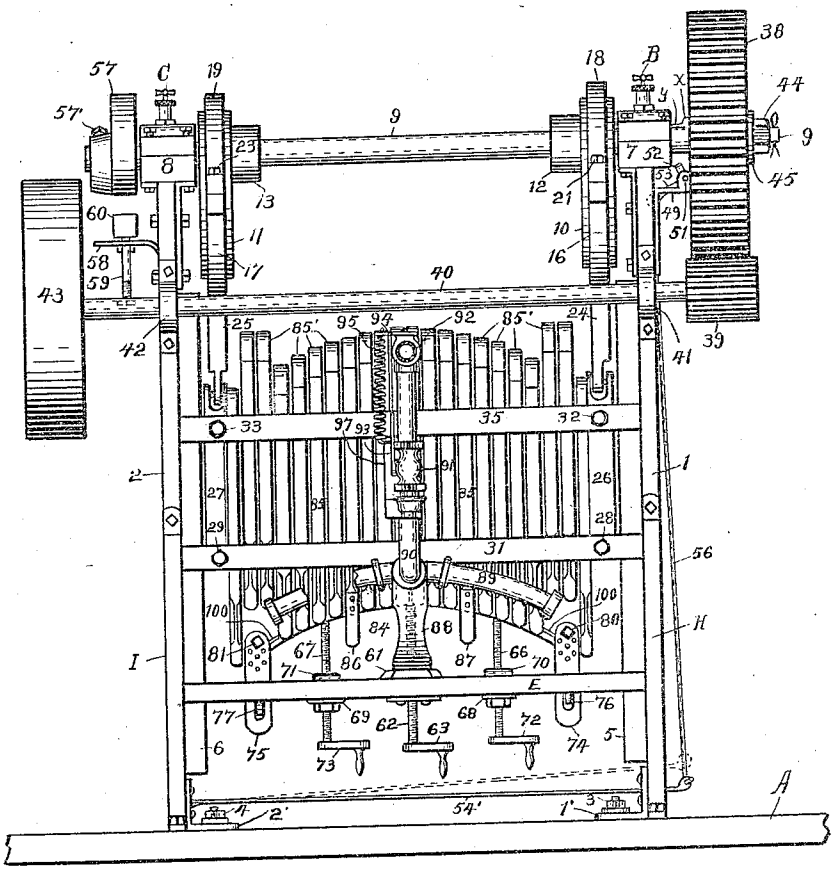


Fig. 2.

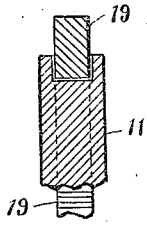


Fig. 13.

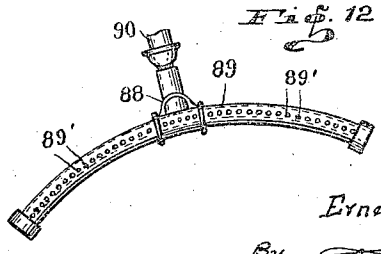


Fig. 12.

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4 SHEETS—SHEET 3.

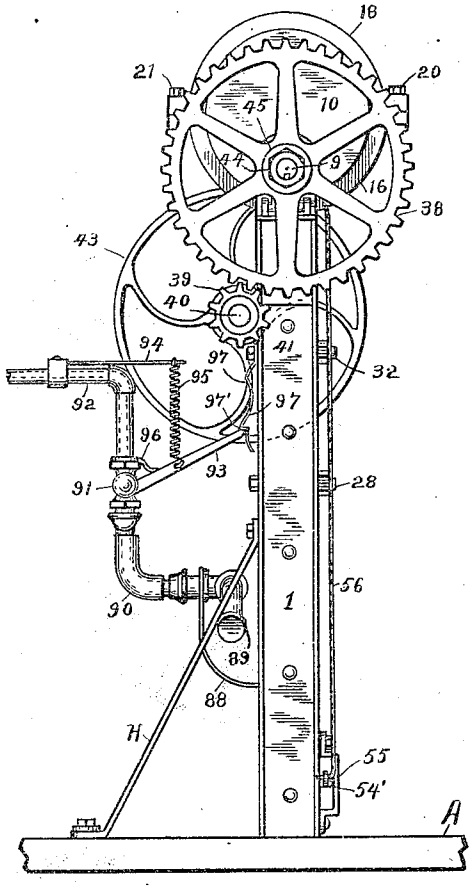



Fig. 3.

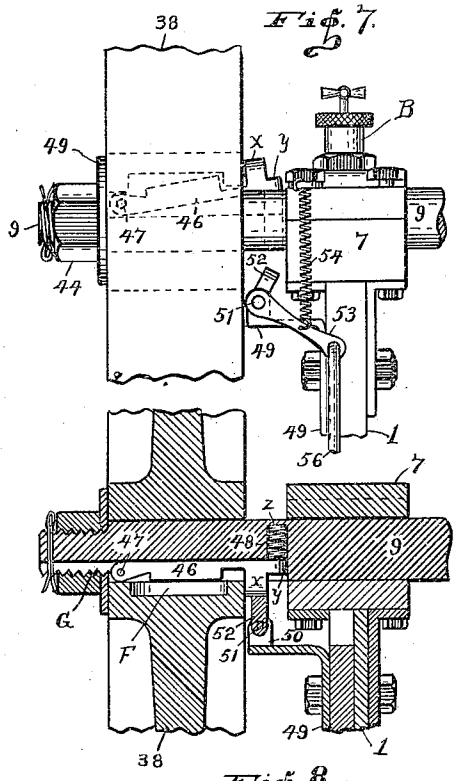



Fig. 7.

Fig. 8.

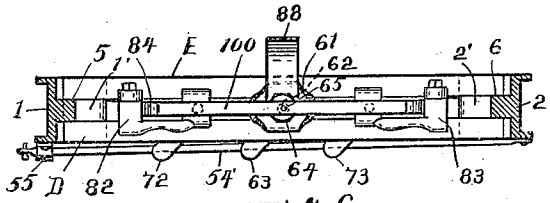



Fig. 6.

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

E. J. GUEUTAL.

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4 SHEETS—SHEET 4.

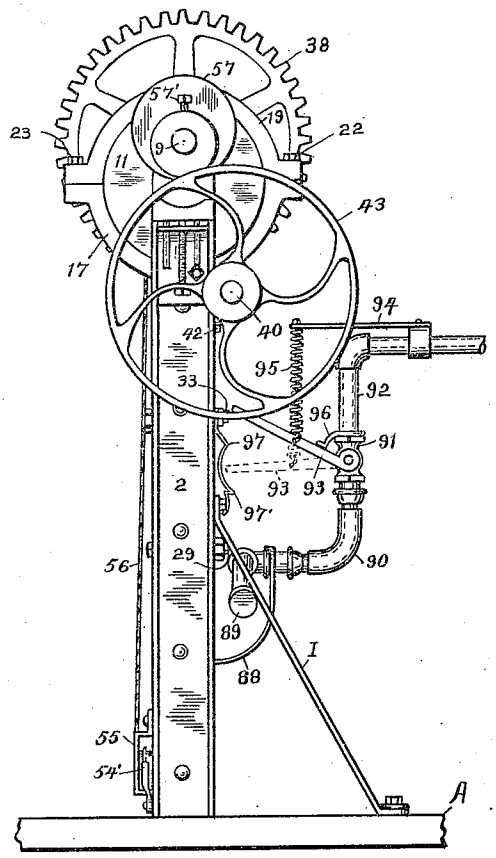



Fig. 4.

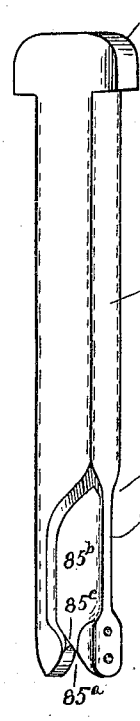



Fig. 9.

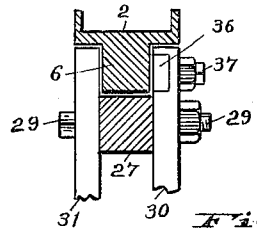



Fig. 10.

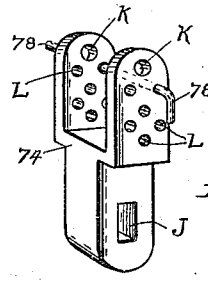



Fig. 11.

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# UNITED STATES PATENT OFFICE.

ERNEST J. GUEUTAL, OF RICHMOND, INDIANA, ASSIGNOR OF ONE-THIRD TO CHARLES A. CHEVRAUX AND ONE-THIRD TO WILLIAM H. MITCHELL, BOTH OF RICHMOND, INDIANA.

## FORMING-MACHINE FOR LEAF-SPRINGS.

1,293,760. Specification of Letters Patent. Patented Feb. 11, 1919.

Application filed September 16, 1918. Serial No. 254,176.

*To all whom it may concern:*

Be it known that I, ERNEST J. GUEUTAL, a citizen of the United States, residing in the city of Richmond, in the county of Wayne, State of Indiana, have invented a new and useful Forming-Machine for Leaf-Springs, of which the following is a full, clear, and comprehensive specification, the same being such as will enable others familiar with the art to make and use the same with exactitude.

The object of this invention, broadly speaking, is to provide a machine for forming leaf-springs, for vehicles or the like, which will be strong and durable in construction, positive in action, simple in character, absolutely accurate in its results, easily operated and controlled, and which can be manufactured and sold at a comparatively low price.

More particularly stated, my object is to provide a machine of the character stated, which will reduce manual labor to a minimum in the formation of leaf-springs, in which the product delivered will be absolutely uniform as to the shape to which the machine is, or may be, set; in which the machine will not became inoperative through wear or long usage, and which will not inadvertently loose the adjustment to which it has been set.

In the production of leaf-springs for automobiles, or other purposes, it is now customary to give to each leaf its final curvature while the material is at a high temperature, and to accomplish this result principally by manual labor and hand tools thereby materially effecting the cost of production. Also it is found that the leaves formed principally by hand labor are not absolutely true or uniform, thereby requiring additional hand labor to bring the leaf into proper alinement, which latter is usually attempted upon an anvil by means of a hand hammer which manifestly materially depreciates the springs life and strength and therefore its value. It has been determined that a leaf which has been hammered after being formed is weaker at the points where a hammer has been used thereon. Therefore to overcome these objections is the fundamental object of this invention.

Other particular objects and advantages of this invention will suggest themselves to the expert mechanician in the course of the following description, and that which is new and useful will be correlated in the appended claims.

In the drawings, forming a part of this specification, Figure 1 is a front elevation of the complete machine, showing the parts in open or raised position ready to receive the material to be formed. Fig. 2 is a rear elevation of the complete machine, showing same in closed or lowered position, that is the position the parts assume when the material is being formed thereby. Fig. 3 is a left-hand end elevation of the complete machine. Fig. 4 is a right-hand end elevation of the machine. Fig. 5 is a sectional view, as taken on the line 5—5 of Fig. 1, looking upward from the floor. Fig. 6 is a sectional view looking down, as taken on the line 6—6 of Fig. 1. Fig. 7 is an elevation showing the clutch mechanism. Fig. 8 is a central vertical section of the clutch mechanism. Fig. 9 is a perspective view of one of the weights. Fig. 10 is a detail section, as taken on the line 10—10 of Fig. 1. Fig. 11 is a perspective view of one of the jacks or form holders. Fig. 12 is a front elevation of the nozzle member of the sprinkler. And Fig. 13 is a detail cross section, showing the manner of mounting the collars with the main eccentrics.

Similar indices denote like parts throughout the several views.

In order that the construction, the operation, and the advantages of the invention may be more fully understood and appreciated, I will now take up a detail description of the preferred construction, which I will set forth as comprehensively as I may.

Referring now to the drawings in detail: Letter A denotes the floor on which the machine rests, and to which it is secured.

*The main frame.*—Extending upward from the floor, and spaced apart, are the main standards 1 and 2, having the respective feet 1′ and 2′ whereby they may be secured to the floor by the respective bolts 3 and 4. Rigidly secured to the opposing inner faces of the standards 1 and 2 are the respective guide-strips or tracks 5 and 6, the same extending vertically parallel with the standards. Extending across between the standards 1 and 2, and contacting with the sides of the tracks 5 and 6, are the table bars D and E. Located on the upper ends of the standards 1 and 2 are the respective

boxings 7 and 8, which carry the main driven shaft 9. Said standards are retained in vertical position by the braces H and I which are secured thereto and extend to the floor A. Carried by the respective boxings 7 and 8 are the oilers B and C.

*Raising and lowering means.*—Located on the shaft 9 and adjoining the inner faces of the respective boxings 7 and 8 are the eccentrics 10 and 11 which have the respective hubs 12 and 13. The said eccentrics are adapted to be rigidly secured on the shaft 9 by means of the set-screws 14 and 15, respectively, as in Fig. 1. A channel is formed around in the periphery of each eccentric 10 and 11 in which operate the respective collars, each of said collars consisting of two segmental portions: The respective body members 16 and 17; and the cap members 18 and 19. The members 16 and 18 being connected by the screws or bolts 20—21, and the members 17 and 19 being connected by the screws or bolts 22—23. Extending down from the centers of the respective members 16 and 17 are the pitmen 24 and 25.

*The carriage.*—Numerals 26 and 27 denote the two vertical end-bars of the carriage, and they are located in sliding contact with the inner faces of the guide-strips 5 and 6, respectively, and with their upper ends hinged or pivoted to the lower ends of the respective pitmen 24 and 25.

Secured across the lower portions of the end-bars 26 and 27, by means of the respective bolts 28 and 29, are the horizontal lower cross-bars 30 and 31; and likewise secured across the upper portions of the end-bars 26 and 27, by means of the bolts 32 and 33, are the upper cross-bars 34 and 35. The ends of the cross-bars 30, 31, 34 and 35 extend beyond the bars 26 and 27 to the respective standards 1 and 2, and they are located in sliding contact with the sides of the respective guide-strips 5 and 6. However, a flat curved spring 36 prevents the ends of the bars 30 and 34 from coming into actual contact with the strips 5 and 6, as shown in Fig. 10. Said springs are each located in a pocket formed in the contact faces of the bars 30 and 34 where each is secured by a bolt 37 with their ends contacting with the strips 5 and 6 for providing the proper tension to prevent horizontal movement of the carriage.

*Driving gear.*—Adapted to revolve on the projecting left-hand end portion of the shaft 9 is the gear-wheel 38, which meshes with the gear-pinion 39, the latter being secured on the left-hand end portion of the drive-shaft 40, as is shown in Fig. 2. The shaft 40 is mounted in boxings 41 and 42 which are carried on the rear faces of the respective standards 1 and 2. Secured on the projecting right-hand end portion of the shaft 40 is the pulley 43, which provides means for connecting the power to drive the machine as, and in the manner hereinafter set forth.

The extreme left-hand end portion of the shaft 9 is threaded to receive the nut 44 which contacts with the washer 45 to retain the gear 38 revolubly on the shaft 9 and in alinement with the pinion 39 located therebelow.

*The clutch.*—Formed in the inner periphery of the hub of the wheel 38, that is extending outward from the shaft 9, is a slot or channel F having closed ends as shown in Fig. 8, that is it does not extend entirely through said hub either to the right or the left. Formed in the periphery of the shaft 9 is a channel G, which extends from the left-hand end of the shaft 9 to the boxing 7, as is shown in Fig. 8. The channels F and G are parallel with each other and they are of the same width with relation to each other.

Numeral 46 denotes a dog whose main portion is adapted to be wholly in the channel G, its left or tail portion being hinged on the pivot 47 whereby the tooth $x$ may swing out and in with relation to the shaft 9. The inner face of the hub of the wheel 38 is in sliding contact with the tooth $x$. The face of the tooth $x$ is rounded in the same direction as the curvature of the shaft 9, and projecting inward to near the inner end of the channel G, integral with the dog 46 and the tooth $x$, is the fin $y$ whose end is curved at right-angles to the curvature of the tooth $x$. Formed in the shaft 9, at right-angles thereto, and directly opposite the fin $y$, is a socket $z$, in which is located the compression spring 48 which is adapted to normally cause the dog to be turned out as it is shown in Fig. 7.

It is now manifest that if the dog be pressed in, as in Fig. 8, that the dog will be withdrawn from the channel F, thereby permitting the wheel 38 to revolve idle on the shaft 9, with said shaft remaining stationary. Should, however, the spring 48 be permitted to turn the dog outward, as in Fig. 7, then as soon as the slot F and the channel G come into registering position with relation to each other the dog 46 will move into the channel F thereby causing the shaft 9 to be revolved with the wheel 38.

*Clutch control.*—Secured to the outer face of the standard 1 is the bracket 49, which is located directly below the shaft 9, said bracket approaches near to the inner face of the wheel 38. Carried by said bracket is a pair of ears which carry the revoluble pivot 51, which is at right-angles to the shaft 9 and directly below the tooth $x$. Rigidly connected with the pivot 51 is the rocking pawl 52. And secured to the pivot 51 is the arm 53 which projects centerward.

Connected at one end to the central portion of the arm 53 is the tension spring 54, with the other end of said spring secured to some stationary part, as the boxing 7.

Hinged to the lower portion of the standard 2 and extending across beyond the standard 1, is the pedal 54′, and it is retained in vertical sliding contact with the standard 1 by the guide 55. Pivoted to the left-hand end of the pedal 54′ is the connecting-rod 56 whose upper end is pivoted to the free end of the arm 53.

It will now be seen that if the pedal 54′ be pressed down that the pawl 52 will be turned out of the path of the tooth $x$, as it is seen in Fig. 7, and then when the pedal is released the spring 54 will cause the pawl 52 to assume its vertical position as in Fig. 8, and of course the pedal will be raised to its normal position.

*Brake.*—Secured on the projecting right-hand end portion of the shaft 9 is an eccentric 57 having a hub with a set-screw 57′ by which the eccentric is adjustably secured to the shaft. Extending out from the standard 2, a short distance below the eccentric 57, is a spring tongue or bracket 58 which carries an adjusting bolt 59, the latter being connected to the brake-shoe 60 which is adapted to contact with the periphery of the eccentric 57.

The position of the eccentric on the shaft 9 is such that when the carriage is at its highest point the eccentric will be at its maximum frictional contact with the brake-shoe 60.

*Pattern holder and adjustment.*—Permanently located on the table-bars D and E, and positioned in the center thereof, is the screw-plate 61 through which is threaded the main vertical adjusting screw 62, which has a crank 63 on its lower end whereby it may be turned as desired for vertical adjustment, and when in the desired position it may be secured by the locking-nut 64. A small pintle 65 extends up from the center of the upper end of the screw 62, for the purpose hereinafter made apparent.

The auxiliary adjusting screws, 66 and 67, are similar to the screw 62 except that they are adapted to be adjusted laterally along the table D—E, they being threaded through their respective screw-plates 68 and 69 and adapted to be secured when adjusted by the respective locking-nuts 70 and 71. Secured on the lower ends of the screws 66 and 67 are the respective cranks 72 and 73.

The jacks 74 and 75 are located outward from said screws and each has a stem, as shown in Fig. 11, adapted to fit between the members D and E where they are adapted to be secured each by a key as for instance the respective keys 76 and 77, which are driven into slots in said stems, as the slot J shown in Fig. 11.

The upper portion of each jack comprises the spaced apart ears each having a large aperture K therethrough and a plurality of small apertures L therebelow. The apertures of the two ears of each jack are located directly opposite to each other as shown. Said smaller apertures are adapted to receive one or more cross-pins, 78 and 79 respectively. In the large apertures K are disposed the respective cross-bolts 80 and 81 which form pivots for the respective cam-levers 82 and 83. The pins 78 and 79, and the cam-levers 82 and 83, are for the purpose of securing the ends of the pattern or form-plate 84, and in practice the cam-levers may be dispensed with and the pins 78 and 79 alone can be used, or the cam-levers may be employed without the said pins, thereby providing an alternative securing means, or they may both be used.

*The weights.*—In this construction I employ a plurality of weights which in fact is the paramount instrumentality of this invention and the key to the entire construction and to which all of the other devices are subsidiary.

As shown in Fig. 9 each weight comprises a relatively long body portion 85, which is rectangular in cross-section, each having a head 85′ on its upper end, which head projects only forward and rearward and not laterally, that is to say the sides or wider portions of the weights are smooth and straight throughout their lengths whereby they may contact flat together from end to end.

In the lower end of each weight is an inverted V-shaped notch $85^a$ which extends from side-to-side of the weight, as in Fig. 9. Above said notch each side of the weight is cut away to form two half pockets $85^b$ and $85^c$ which open through the rear edge of the weight but not through the forward edge thereof. Between the two half-pockets is a thin web $85^d$, and below the web the rear face of the weight assumes the same width as that above the web. Each of said half pockets converge at their lower ends into a small mouth $85^e$ which leads into the vortex of the notch $85^a$. When the weights are in contact with each other, as in Figs. 1 and 2 then the half-pocket of one combined with the half-pocket of the weight next thereto form a complete pocket, for the purpose hereinafter stated.

The weights are of such depth as to fit slidably between the bars 34 and 35, and between the bars 30 and 31, with the shoulders formed by the heads 85′ resting on the bars 34 and 35, by which all of the weights are adapted to be suspended, as in Fig. 1, there being twenty-two weights in this instance, but the number may be varied as desired to meet varying conditions.

*Approximate alining fingers.*—Secured to

the rear faces of two of the weights 85 are the two fingers 86 and 87, as shown in Fig. 2, which project below the weights to insure the material to be operated on being located in approximate position for the operation hereinafter set forth.

In this connection it is well to call attention to the fact that positive and absolute alining of the material with the plate 84 is assured by reason of the notches $85^a$ in the ends of the weights, whereby as the weights descend the sides of the notches will first engage the edges of the material and as the weight is applied it is evident that the material will be forced into absolute alinement with the form plate 84, thereby insuring that the material will be bent absolutely true and correct.

*Automatic sprinkler.*—Secured to some stationary object is the bracket 88, which in this instance is secured to the screw 62 by the nut 64. Said bracket extends rearward and upward for supporting the nozzle member 89 which has a multitude of jet-apertures 89′ in the forward face thereof. Said nozzle has a vertical curvature corresponding with the curve of the plate 84, and the jet-apertures are located directly back of the said pockets which are formed by the half-pockets $85^b$ and $85^c$, when the weights 85 are down to their limits as in Fig. 2.

Leading back and then upward from the center of the nozzle 89 is the pipe 90 which connects with the service valve 91, from which latter extends the pipe 92 which leads from a source of water supply under pressure.

Connected with the core of the valve 91 is the arm 93 which is adapted to shut off the flow of water when in the position in which it is shown by full lines in Fig. 4, or when moved down, as is indicated by dotted lines in the same view, the water will be turned on, to flow through the jet apertures.

Extending forward toward the machine from some stationary object, as the pipe 92, is a finger 94 to which is attached the helical spring 95. The lower end of said spring is attached, under tension, to the arm 93 whereby the said arm will move to its upward position whenever it is released. A stop 96 prevents the arm 93 from moving upward beyond the position required to shut off the water.

Numeral 97 denotes a spring formed of flat material, having its upper end secured to the bar 35, from which it projects downward in alinement with the arm 93 and directly forward thereof, there being a shoulder 97′ formed in the lower portion of the spring 97 which, when the bar 35 and the arm 93 are upward to their limits engages the point of the arm 93, as shown in Fig. 3.

It is now evident that as the carriage moves downward that the lever or arm 93 will be forced downward by the spring 97 until a certain point is reached when the point of the arm 93 will slide off from the shoulder 97′ and will be immediately returned to normal position by the spring 95, to be again engaged by said shoulder when the carriage moves upward to its limit.

As it requires an interval of time for the water to reach the jets, after being turned on, it is found that this arrangement will cause the water to be delivered to the hot material synchronously with the completion of the bending of the material to the shape of the form plate.

*Material to be operated on.*—Numeral 100 denotes a blank or unbent leaf of a spring, the same is usually provided with a hole or aperture formed through its center through which may be disposed the pintle 65, said hole being afterward employed as a bolt aperture when the leaves are assembled into a complete spring. However said hole may be dispensed with and other means be employed as desired for connecting the leaves, in which event other means may be employed for positioning the leaf or blank upon the form-plate.

*Modus operandi.*—The purpose of the machine, and its construction, having now been made clear the operation thereof is substantially as follows: First assuming that power is applied to the pulley 43 whereby the gear wheel 38 will be revolved continuously at a comparatively slow rate of speed but with considerable power in reserve. The carriage will now be upward to its limit, thereby suspending all of the weights 85 as in Fig. 1. The form plate 84 having been contoured and secured in the proper curve which is desired for the product, the material or blank 100, having been previously heated to the desired degree of temperature, it is placed on the form 84, causing the pintle 65 to pass through the center hole of the leaf. It is now manifest that the fingers 86 and 87 will insure approximate but not absolute alinement of the material with relation to the form 84.

The operator then presses the pedal 54′, which will tip the pawl 52 inward, thereby releasing the tooth $x$, and permitting the dog to engage in the channel F of the wheel 38, thereby causing the shaft 9 to be rotated one revolution, for as the operator immediately releases the pedal it is evident that the pawl will be returned to vertical position, therefore as the shaft 9 is completing its revolution the tooth $x$ will engage the pawl 52 thereby forcing the dog out of the channel F, thereby stopping the shaft 9 in its first position stated, as in Fig. 1.

Now, during this one revolution of the shaft 9 it will be observed that the operation of the eccentrics 10 and 11 are such that the carriage will be lowered to the position in

which it is shown in Fig. 2, and then following closely thereafter it will be raised back to its first position. The downward movement of the carriage will release the weights 85, permitting their lower ends to impinge the material 100, and their combined weight will bend the material 100 to the contour of the plate 84, the weights being applied first in the center of the material and then gradually applied right and left to the ends thereof, which has been determined by experts to be the correct manner of bending in order to give the best results, but heretofore this has not been successfully accomplished.

It should be observed that as the weights reach their highest point of suspension that the shaft 9 will be released from the power, and at this instant the brake will be in position to prevent the shaft 9 from turning beyond dead-center of the eccentrics, thereby holding the carriage and retaining the weights in suspension as in Fig. 1.

As the carriage moves downward it is evident that the shoulder of the spring-arm 97 which is carried by the cross-arm or bar 35 will press down the valve arm 93, releasing the water pressure, whereby immediately after the weights have shaped the material to its final curvature there will be sprays of water injected into the pocket of the weights and this water will be directed down upon the hot material thereby slightly cooling it and causing it to retain its shape, but immediately thereafter the arm 93 of the valve will be drawn back by the spring 95 thereby shutting off the water before the weights are lifted from the material.

Then as the weights are lifted from the material the latter may be removed in any desired manner, either by tongs or by automatic means connected with the machine, and immediately after being removed from the machine the formed material or leaf is placed in a bath of oil in order to complete the tempering thereof.

I desire to emphasize the fact that the bending of the material is accomplished simply by the gravity of the weights which, manifestly, is always uniform and requires no delicate adjustments of springs which are liable to gradually loose their desired tension or adjustment; and a still more important result is that the bending is accomplished from the center of the material outward to its ends, thereby insuring absolute evenness and uniformity of the resultant product.

Having now fully shown and described my invention, what I claim and desire to secure by Letters Patent of the United States, is—

1. A forming machine for leaf springs, comprising in combination, a frame, a main shaft adapted to be revolved continuously by power, an auxiliary shaft geared to the main shaft and adapted to give a single revolution only at the will of the operator, eccentrics carried by the auxiliary shaft, a carriage mounted to operate vertically in the frame, arms connecting the eccentrics with said carriage, a plurality of flat elongated weights each having a head on its upper end to be engaged by the carriage, a former-plate located below said weights, jacks in which the ends of the former-plate are adjustably secured, screws for supporting the form-plate intermediate the jacks and adapted to give the desired curvature to the form-plate, means for centering the material on the form-plate, the lower ends of said weights being constructed in such manner as to aline the material when it is being formed, and means for automatically injecting water between the lower ends of the weights when they are in contact with the material being formed.

2. A machine for forming leaf springs, including an adjustable form-plate, means for supporting the form plate in the desired curvature, means for centering the material to be formed on said form-plate, a plurality of weights, means for lifting the weights by power and permitting them to descend by gravity upon the material located on the form-plate whereby the material will be caused to assume the shape of the form-plate, automatic means for injecting water between the weights when they are in contact with the material being formed and by which the water will be cut off as the weights are lifted from the material, and a foot pedal for causing the weights to decend, all substantialy as shown and described.

In testimony whereof I have hereunto subscribed my name to this specification in the presence of two subscribing witnesses.

ERNEST J. GUEUTAL.

Witnesses:

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R. E. RANDLE.

**Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."**