

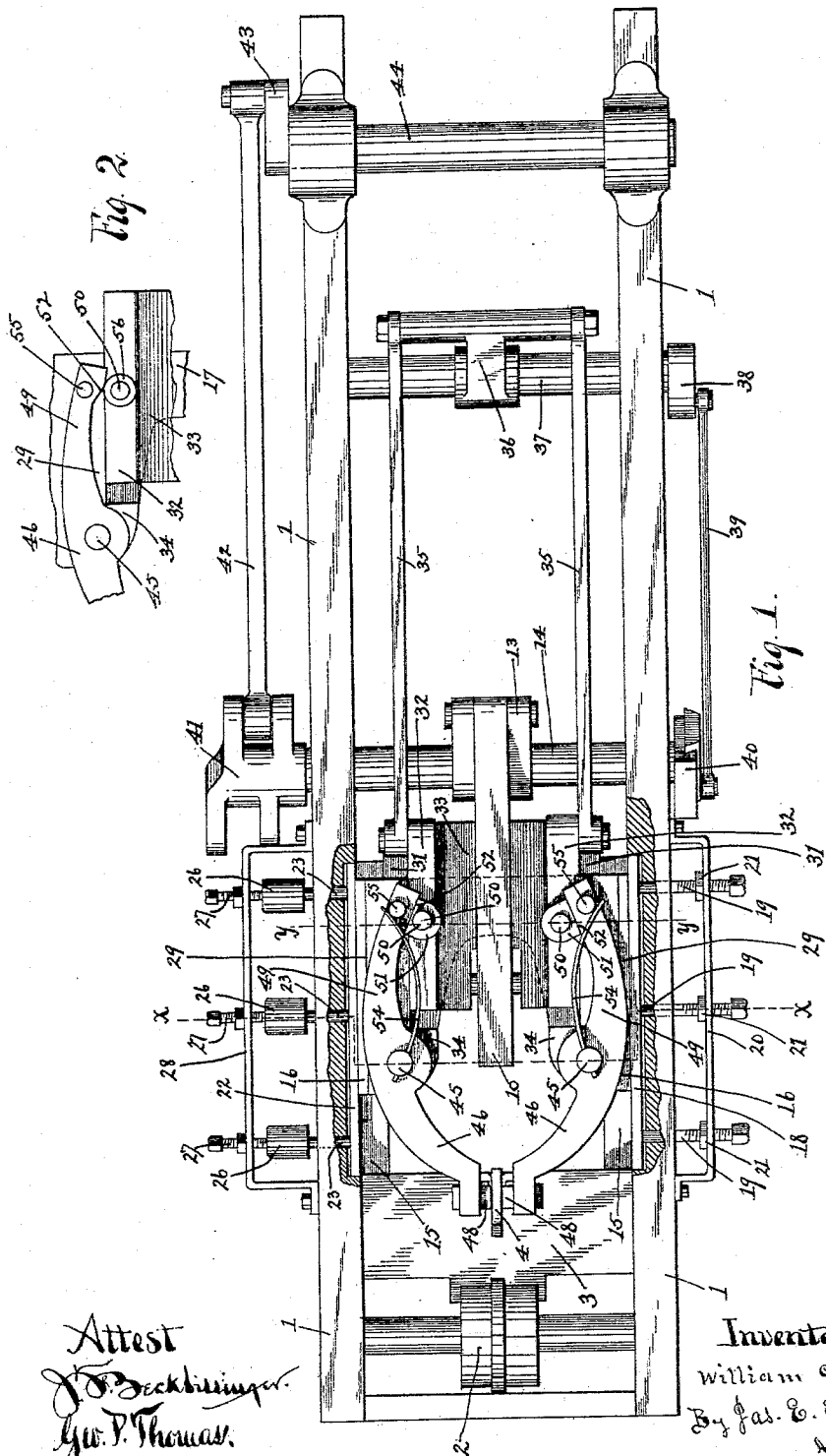
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3 Sheets—Sheet 1.

W. GOLDIE.
MACHINE FOR MANUFACTURING SPIKES.

No. 533,800.

Patented Feb. 5, 1895.



Attest
J. D. Beckwith.
Geo. P. Thomas.

Inventor.
William Goldie
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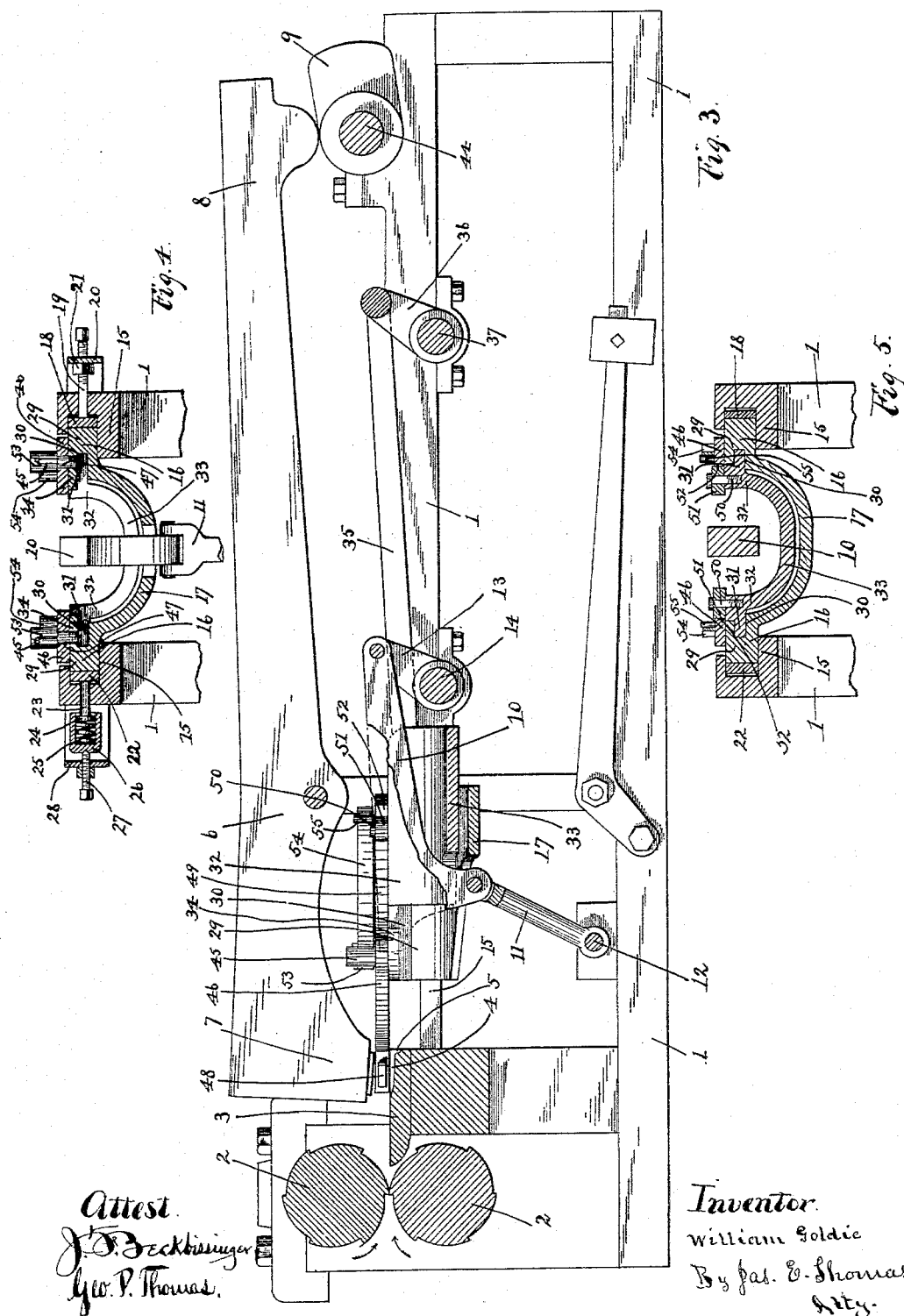
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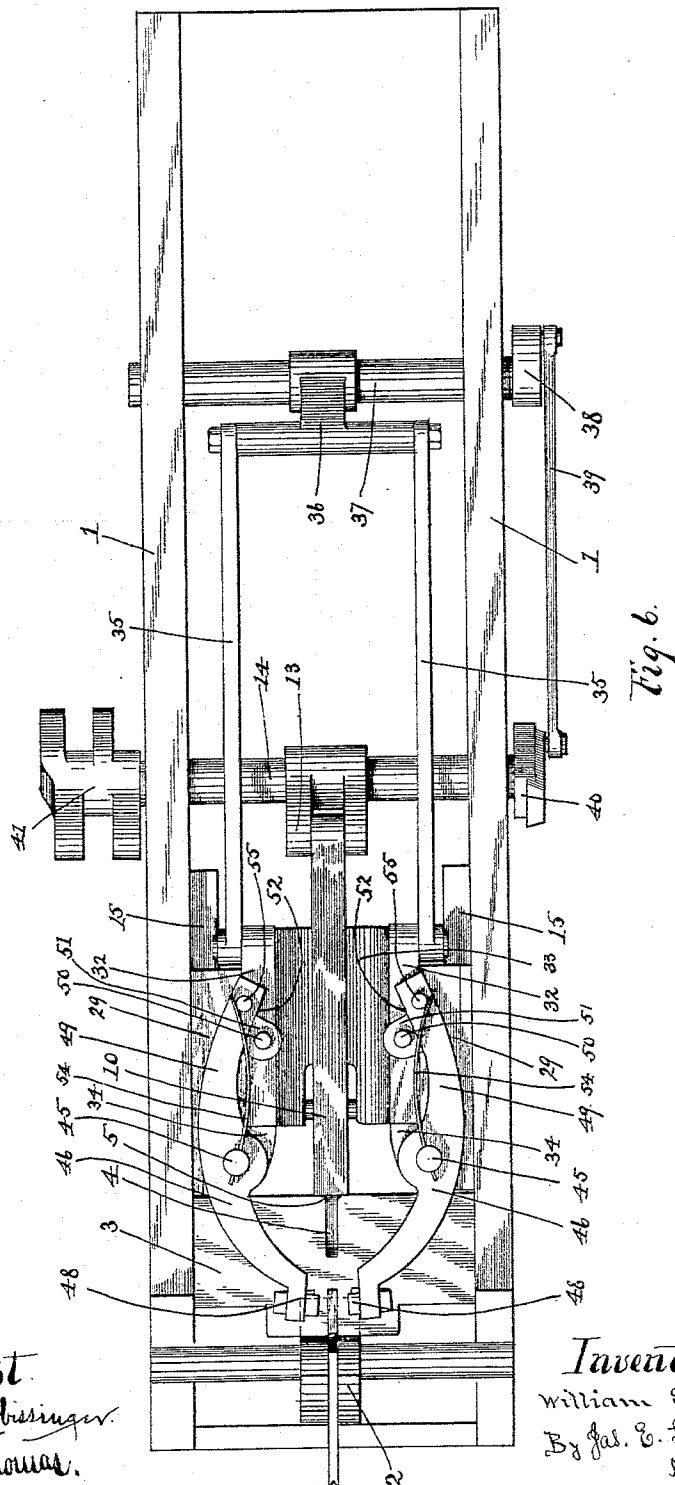
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UNITED STATES PATENT OFFICE.

WILLIAM GOLDIE, OF WEST BAY CITY, MICHIGAN, ASSIGNOR TO DILWORTH,
PORTER & CO., LIMITED.

MACHINE FOR MANUFACTURING SPIKES.

SPECIFICATION forming part of Letters Patent No. 533,800, dated February 5, 1895.

Application filed December 14, 1891. Serial No. 415,008. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM GOLDIE, a citizen of the United States, residing at West Bay City, in the county of Bay and State of Michigan, have invented certain new and useful Improvements in Machines for Manufacturing Spikes, of which the following is a specification, reference being had therein to the accompanying drawings.

10 This invention relates to improvements in machines for manufacturing spikes of the class described and illustrated in Letters Patent Nos. 32,213 and 111,013, and the invention pertains particularly to improvements in the mechanism for nipping and moving the spike from the rolls, where it is pointed and cut from the bar, to the clamping and heading devices.

15 The invention consists in the combination and construction of the several devices and contrivances which are used in erecting the machine, and the arrangement and operation of the same as I shall specifically describe in the following specification and which will also be mentioned and pointed out in the claims which follow.

20 The object of the invention is to provide nipper mechanism for an automatic spike machine, which will grasp, move, and release the spike with accuracy and precision, and at the same time be capable of extended service and wear, and bereliable and positive in its action.

25 Another object is to provide mechanism for operating the nipper devices in an automatic spike machine, which will operate without undue wear, and can be easily adjusted and operated, and in which the operating parts remain in full contact and engagement, so as to prevent noise and breakage, and at the same time allow the machine to be run at a faster speed.

30 I attain these objects by means of the mechanism illustrated in the accompanying drawings, in which the figures of reference used in the following description will be found indicating the same parts throughout the several views.

35 Figure 1, in the drawings represents a plan view of the spike machine, embodying my improvements, partly sectional, and showing the position of the parts when the nippers are

about to release the spike blank. Fig. 2, is a modified form of the gripper operating mechanism. Fig. 3, is a central longitudinal section of Fig. 1. Fig. 4, is a transverse section of the machine taken at $x-x$ in Fig. 1. Fig. 5, is a transverse section of the machine taken at $y-y$ in Fig. 1. Fig. 6, is a plan view of a portion of the machine and shows the position of the upper devices when about to grasp a spike blank.

1, represents the frame of the machine and 2, is a pair of rolls for feeding the bar and for forming the point and cutting the spike blank from the bar, and these rolls are arranged and suitably mounted at one end of the frame in the ordinary manner, and are provided with any desired suitable means for revolving the rolls intermittently or continuously as desired, in the direction of the arrows shown in Fig. 3, and immediately in rear of the rolls is arranged a head block 3, which receives the spike blank as it passes from the rolls, and on the rear edge of this head block is arranged a slot 4, in alignment with the rolls, and on the outer edge of this slot is arranged a die recess 5, into which the metal of the blank is forced to produce the spike head.

6, is a gripping lever pivoted by its middle portion to supports located centrally on the upper portion of the machine frame, and its forward end 7, is located directly over the slot 4, and is provided on its under side with a suitable gripping device for grasping the spike blank which may be resting in the slot, and beneath the rear end 8, of the lever is arranged a revolving cam 9, which oscillates the lever and also retains the lever in stationary positions at the ends of both its upward and downward movements so as to provide time for placing a blank in the slot beneath, and to hold the blank solidly during the heading operation.

Directly beneath the forward end 7, of the lever, is placed a heading tool 10, supported on its forward end by a rod 11, which is pivoted by its upper end to the heading tool and by its lower end to a yielding support 12, carried by the machine frame, and to the rear end of the heading tool is pivotally secured the crank 13, which extends from a rock shaft 14, journaled upon the machine frame, the os-

cillation of which by suitable mechanism operates the crank while the cam 9, is operating the lever 6, to grip the blank to propel the heading tool forward to upset the end of the blank for producing the head.

Upon opposite sides of the upper horizontal frame pieces are arranged the ways 15, and upon these ways is mounted by suitable guides 16, projecting from its lateral sides, a main cross head 17, the central portion of which is depressed to provide room for the heading tool, and upon the outer side of one of the ways 15, is placed a wear strip 18, of brass or other suitable metal which is arranged to be forced inwardly against the lateral side of the guide by horizontal screws 19, passing through the outer portion of the way, and through a support 20, secured to the outer side of the machine frame, the screws being provided with joint nuts 21, for retaining the parts in position.

Upon the opposite side of the machine the way 15, is provided with a wear strip 22, similar to the strip 18, and 23, are short studs passed through the outer side portion of the way and with their inner ends resting against the wear piece 22, while their outer ends are each provided with a head 24, against which a spring 25, rests, the spring being carried by a cover or support 26, and 27, are adjusting screws passed through a support 28, secured to the outer side of the machine frame, and so that the inner ends of the screws rest against the outer side of the cover 26, which, as the screws are turned inwardly, move forward and compress the springs against the heads 24, and move the studs to force the wear piece 22, against the guide for a purpose which will be presently explained.

Upon the inner sides of the lateral portions 29, of the lower or main cross head 17, and opposite the guides 16, are provided the slots 30, and in these slots are mounted the guides 31, which project from the lateral side portions 32, of a supplemental or upper cross head 33, and these guides are fitted to reciprocate within the slots while the upper surface of the portions 32, is arranged to coincide with the surface of the parts 29, while the middle portion of this cross head is depressed to extend across and between the heading tool and the depressed portion of the cross head 17.

The front portions of the parts 29, are extended horizontally inward, so as to form shoulders 34, against which the forward ends of the parts 32, engage when the upper cross head 33, is moved forward, and to the lateral sides of the rear portion of the portions 32, are pivoted the forward ends of the connecting rods 35, the rear ends of the rods being pivotally connected to the outer end of a rock arm 36, which is mounted on a rock shaft 37, journaled upon the machine frame, and which is provided with a crank 38, on its outer end upon which is mounted one end of a connecting rod 39, while the opposite end

of the rod is pivotally connected with a crank 40, upon the outer end of the shaft 14, to which motion is imparted by the crank 41, on the end of the shaft, and the rod 42, connecting the crank 41, with a crank 43, mounted on the shaft 44, which also carries the cam 9, before mentioned, so that all of the parts are arranged to move in unison.

Upon the forward ends of the lateral portions 29, of the main cross head are located the vertical studs 45, and upon these studs are mounted the nipper levers 46, the levers being provided with centrally located vertical openings 47, which are passed over the studs, and these levers are arranged with their ends curved toward each other, and are provided on their forwardly extending ends with jaws 48, arranged at a suitable distance from each other to properly grip the spike blank by its lateral sides as the blank passes from the rolls, and the rear end portions of the levers are provided on their inner sides with rearwardly converging surfaces 49, and upon the rear parts of the lateral portions 32, of the upper cross head, are arranged the vertical studs 50, upon which are mounted the oscillating pieces 51, with their outer surfaces 52, in contact with the surfaces 49, of the levers.

The upper ends of the studs 45, extend above the levers 46, and are provided with transverse openings 53, in which are passed the ends of the springs 54, while the rear ends of the springs are made to bear inwardly upon the studs or pins 55, which project upwardly from the rear end of the levers, so that the surfaces 49, are always retained in contact with the pieces 51.

The springs 25, are compressed by the screws 27, until the wear pieces 22, are forced against the lateral side of the guide portion 16, until the guides are held tightly between the wear strips 18, and 22, so that greatly more power is required to move the main cross head 17, than to move the upper cross head 33, so that when the parts are in position for dropping the spike blank in the heading slot as shown in Fig. 1, the shaft 37, is oscillated to throw the arm 36, and rods 35, forwardly, and the rods then move the cross head 33, forward alone until the forward ends of the lateral portions 32, strike the shoulders 34, and during this time the main cross head 17, which carries the studs 45, and the nipper levers 46, remains at rest, and the blocks 51, carried by the upper cross head moving forward along the converging surfaces, allow the rear ends of the nipper levers to move toward each other, and move the nipper jaws 48, away from the spike blank held thereby and which spike released from the jaws drops into the slot 4, and is then caught by the grip lever 6, and firmly held while the heading tool 10, makes its forward movement and heads the blank, and during this operation the upper cross head in contact with the shoulders 34, moves the main cross head forwardly until the extended jaws of the nipper levers are in a position in

proximity to the feeding rolls and ready to catch the spike blank projecting therefrom, and then the reverse movement is applied to the rods 35, to start the upper cross head 33, rearwardly and away from the shoulders 34, and the blocks 51, then travel rearward over the surfaces 49, and moving thereby the rear ends of the upper levers outwardly, close the jaws upon the opposite lateral sides of the blank with sufficient force to arrest the outward movement of the rear ends of the levers, and the blocks then remaining stationary on the surfaces 49, causes the main cross head to move in unison with the upper cross head until the spike blank has reached its proper position over the slot 4, as shown in Fig. 1, and then the forward movement of the parts is repeated, and the blank is left for the heading operation.

It will be seen of course that the force with which the blank is grasped by the nipper jaws, is in ratio to the resistance imparted to the main cross head by the springs 25, as a heavy strain placed upon the lateral sides of the cross-head by increasing the tension of the springs, necessitates a great force to be applied for moving the cross head, and the blocks 51, in contact with the converging surfaces 49, being the means for moving the main cross head, the blocks move over the surfaces and close the jaws upon the blank until the resistance of the blank is sufficient to arrest the movement of the levers, and the blocks then becoming stationary cause the main cross head to move to the rear with the levers holding the blank with the same force.

The arrangement of the nipper levers with the converging surfaces 49, as described for working against the contact surfaces of the blocks 51, by the action of the springs, is very important, as the machine is run at a high speed, and the to and fro motion of the cross heads is so rapid that all of the parts of the operating mechanism must have a full bearing and positive contact so that no jar or pounding effect is obtained when the motion of the cross head is reversed for releasing the blank, and by providing the blocks 51, to operate the nipper levers, a surface of considerable area is provided, for operating on the rear converging surfaces by the levers while the work of grasping the blank and moving the cross heads to the rear is being done, and the springs operating upon the levers to hold the surfaces thereon in contact with the blocks, at all times provides a sure and easy action of the jaws for releasing the blank as the upper cross head starts forward, so that the blank is dropped from the jaws squarely into the slot and all liability of dropping the blank awry in the slot, from jarring the nipper levers by the releasing mechanism is avoided. Of course the feeding rolls are so arranged as to sever or nearly sever the blank from the bar, but owing to the cutting dies operating on the hot bars, a softening and wearing action obtains on the cutters, which, after a

short time, leaves the point end of the blank held to the bar by a thin web of metal, so that it becomes necessary for the nippers to pull the blank away from the bar, and sever the web by breaking and this is easily accomplished, when the bars fully heated are first placed in the rolls, but as each successive blank is severed the heat of the bar is reduced by radiation and water on the rolls, so that toward the latter end of the bar the power required for pulling the blank from the bar is enormous, so that a continually varying pressure is required upon the nipper jaws, in order to do the work with accuracy, and this is obtained by the inclination of the converging surfaces, as a greater strain applied for moving the upper levers rearward moves the blocks farther along the converging surfaces which puts a corresponding compression of the jaws upon the spike blank and makes the severing operation sure and positive, and this is the condition in a very great degree when steel bars are used, as the steel web left by the dies becomes exceedingly tough and hard to break, so that the contact surfaces of the levers and the blocks 51, are continually subjected to an immense strain, with a consequent increase and wear of the parts; but by providing the studs 50, with the blocks 51, in a manner to allow the blocks to oscillate as the inclination of the converging surfaces is changed by the oscillation of the levers of the studs, great durability and efficiency are acquired and all liability of breaking the machine from the nippers slipping and loosing the blank is avoided, as the failure of the upper levers to operate allows two or more blanks to go to the heading devices at the same time, and then breaking of the machine follows.

Another great advantage is gained by the action of the springs 25, as it has been common heretofore with machines of this class to use screws for placing a solid and positive lateral strain on the main cross head, but owing to the heat developed by the intense lateral pressure necessary upon the guides, the cross head soon expands, and produces a greater strain than is required, and then a breakage of cross head or some portion of the operating mechanism obtains, while the proper tension being once placed upon the springs for producing the required resistance in the cross head, the action of the cross head remains the same under all conditions, as when the parts become heated and expanded, the springs are only slightly compressed and the variation of the resistance is so slight that the operation of the machine is not affected or changed.

Of course it will be seen that the most important feature of the invention is to provide a sufficient wearing surface for the contact of the nipper levers and their operating mechanism, and to so arrange and construct the parts that no lost motion of the operating mechanism obtains at the beginning of the

forward movement of the upper cross head, whereby an accurate, positive and simultaneous action of the nipper jaws for releasing the blank is obtained, and the speed of the machine can be increased; and it will also be seen that devices equivalent to the blocks 51, may be used instead thereof and produce the same result, one form of devices being shown in Fig. 2, where a roller 56, is mounted on the studs 50, in place of the blocks 51, and the roller then while reducing the friction of the contact also presents a rolling contact to the converging surfaces and prevents undue wear and cutting of the parts; and I wish it to be understood also that, the springs 53, can be otherwise supported and located, and the form thereof can be changed without departing from the intent and meaning of my invention as the office and function of the springs are entirely confined to moving the gripper jaws away from each other for releasing the blank and for retaining the jaws in a proper position for receiving the blank, and I do not confine my invention entirely to the form or variety of springs shown.

The shoulders 34, are shown as projecting inwardly from the forward lateral portions of the main cross head, so as to be in the path of and come in contact with the lateral portions of the forward end of the upper cross head, but this special location of the contact portions for moving the cross heads forwardly in unison is not essential, as, if more convenient, the contact portions for this purpose may be arranged and located in any other position, so long as a proper positive contact is effected on both lateral portions of the cross heads at a point substantially on the same plane with the guides which carry the main cross head and which provide the proper resistance for the same, and also on the same plane with the pivotal connection of the rods actuating the cross heads, as this provides against all tendency to cant or tilt the cross heads so that their movement is true and equal and without undue strain on their operating mechanism.

Having described the construction and operation of my improvement, what I claim as my invention is—

1. The combination of the frame carrying devices for feeding, pointing and heading the spike blank, a main lower cross head for sliding on the frame, an upper cross head arranged for sliding on said main cross head, the nipper levers pivoted by their middle portions to the lateral forward portions of said main cross head, and provided on their forward ends with jaws for grasping the blank and

with their rear end portions turned inwardly, with blocks, as 51, pivotally secured to said upper cross head and with their outer sides in contact with said inwardly turned ends of the levers, the springs for actuating the rear ends of said levers inwardly to contact with the blocks and means for moving said upper cross head to and fro, substantially as set forth.

2. The combination with the frame carrying devices for feeding, pointing and heading the spike blank, the lower main cross head for sliding on the frame and provided with the studs 45, on its forward portion, and with shoulders 34, the upper cross head arranged for sliding on the said main cross head and means for moving the upper cross head to and fro, the gripper levers provided with central openings mounted on said studs 45, and provided on their rear ends with converging surfaces 52, and having gripper jaws on their forwardly extending ends, with the blocks 51, in contact with the said converging surfaces 52, and pivotally secured to the said upper cross head, and springs 54 with their forward ends rigidly secured to the studs 45, and with their rear ends bearing inwardly on the rear ends of said gripper levers, substantially as set forth.

3. The combination of the frame carrying devices for feeding the bar and for severing, pointing, and heading the spike blank, and provided with ways 15, on its outer opposite sides, the main cross head having guide portions resting in said ways, the wear strip 22, in one of said ways outside of the guide portion, studs 23, passed through the outer side of said way and with their inner ends against said wear strip, the springs 25, for actuating the studs and wear strip inwardly, the adjusting screws for regulating the tension of the springs, the upper cross head arranged for sliding on the main cross head, the nipper levers pivotally mounted on said main cross head and provided on their forward ends with jaws for grasping the blank, and mechanism carried by the nipper cross head for oscillating the levers on their pivots to grasp and release the blank, and means for moving the nipper cross head independently and for moving both cross heads in unison, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM GOLDIE.

Witnesses:

JAS. E. THOMAS,
FRANK H. DURELL.