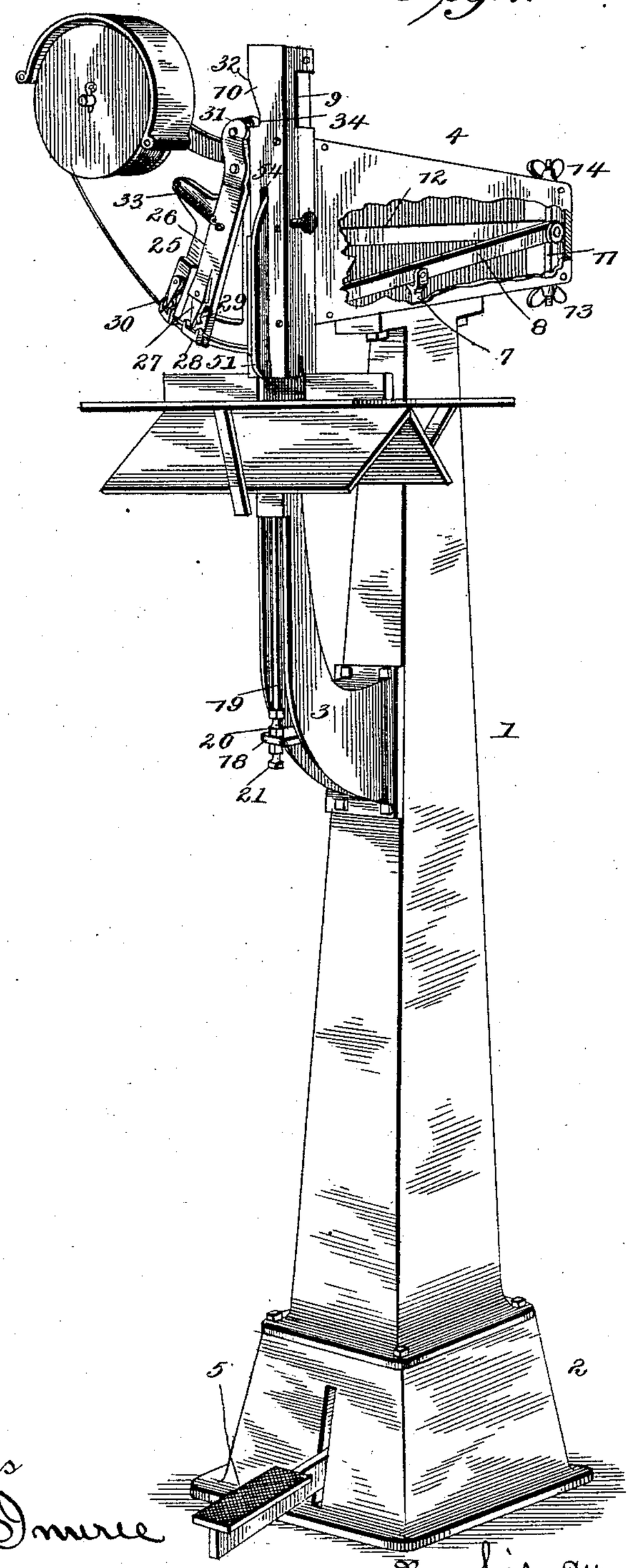
(No Model.) 4 Sheets—Sheet 1.

W. E. ARNOLD.

WIRE STAPLE MAKING AND DRIVING MACHINE.

No. 472,516. Patented Apr. 12, 1892.

Fig. 1.



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By his Attorney
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WIRE STAPLE MAKING AND DRIVING MACHINE.

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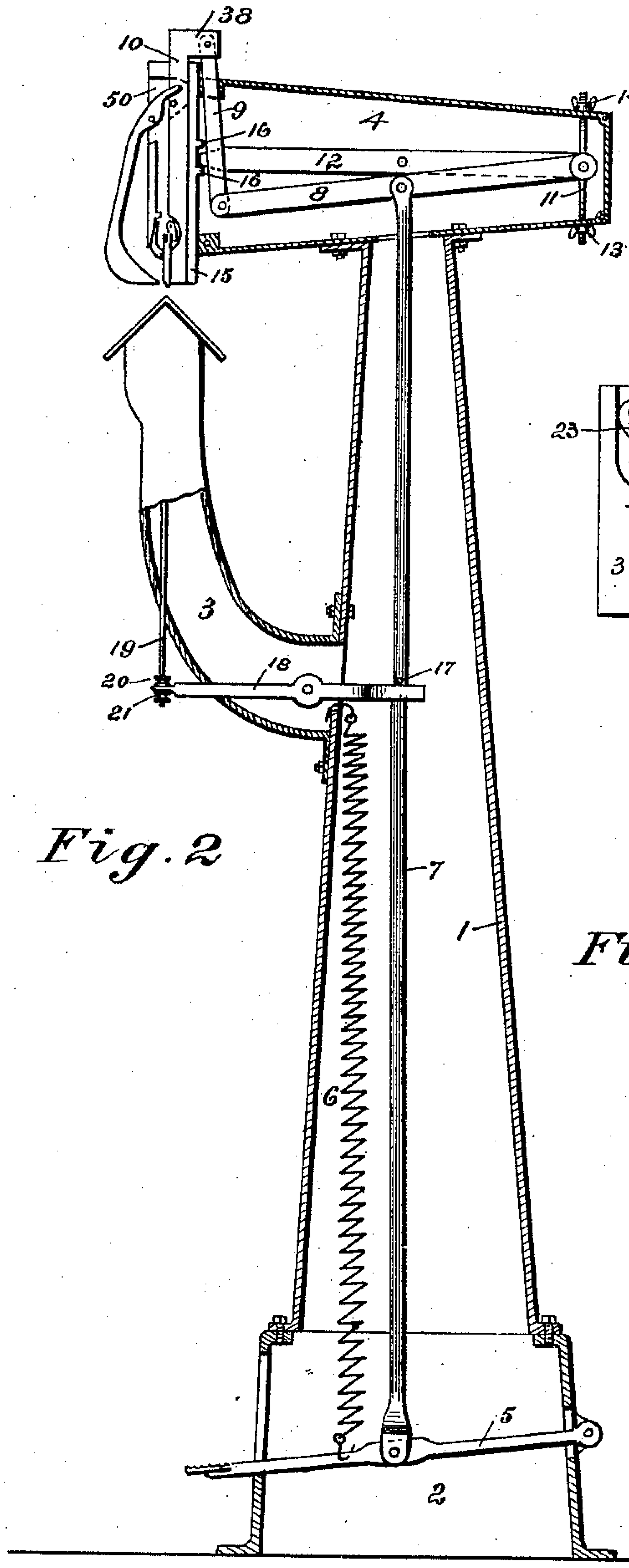

Fig. 2

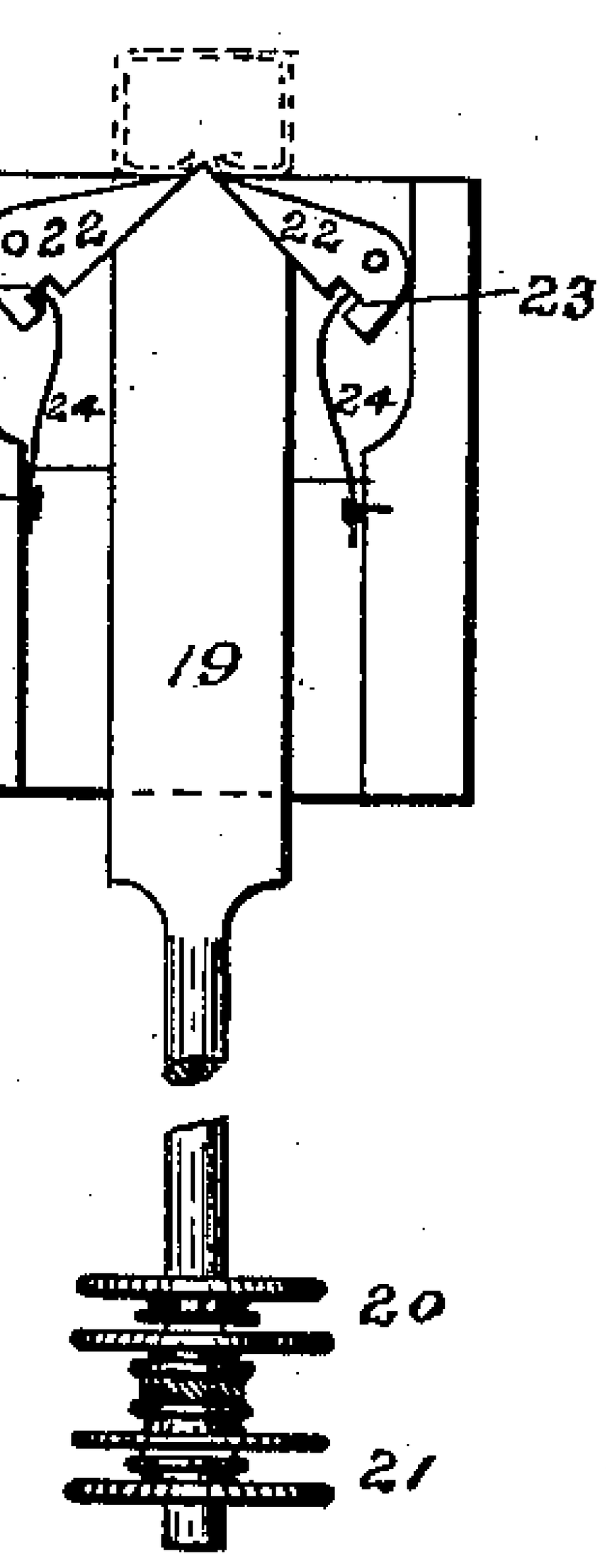

Fig. 3

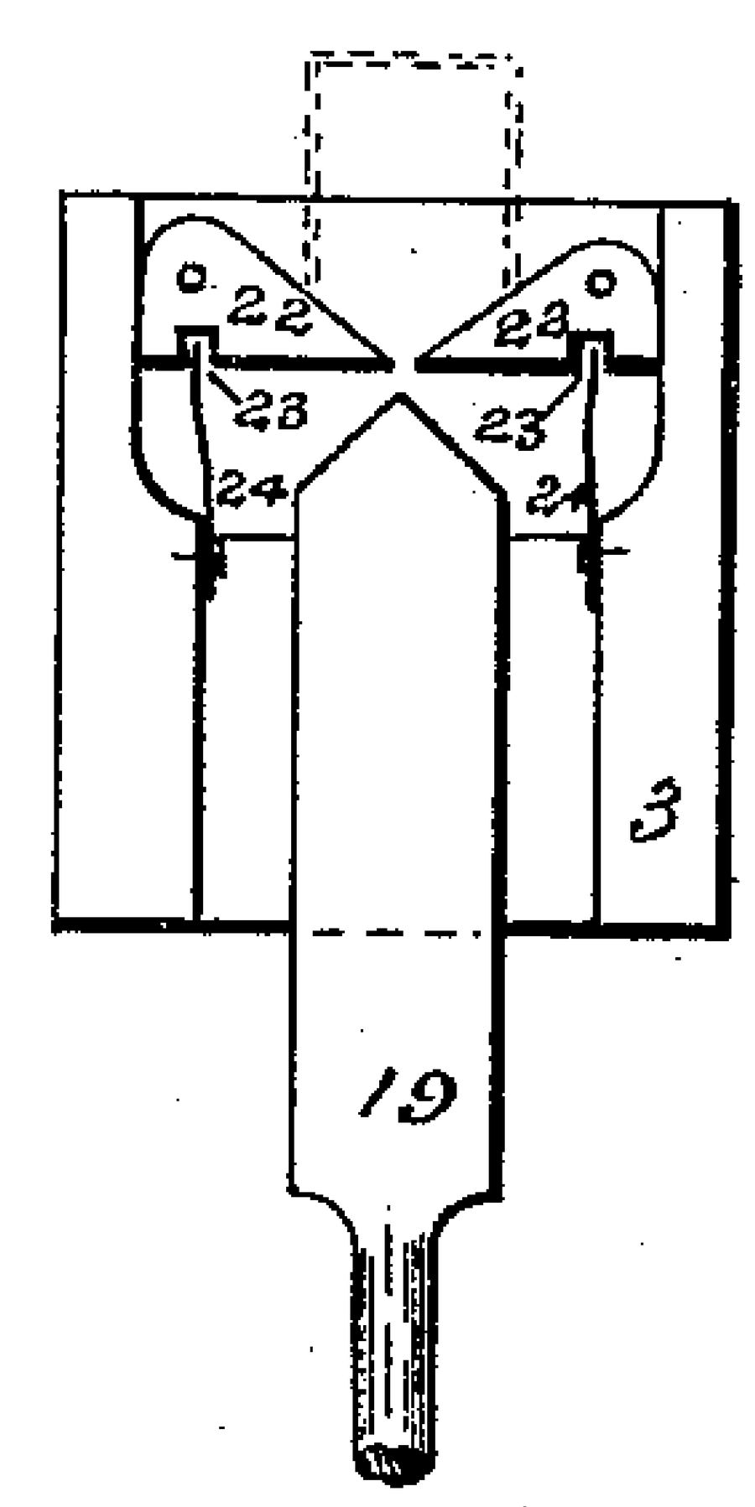

Fig. 4

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WIRE STAPLE MAKING AND DRIVING MACHINE.

No. 472,516. Patented Apr. 12, 1892.

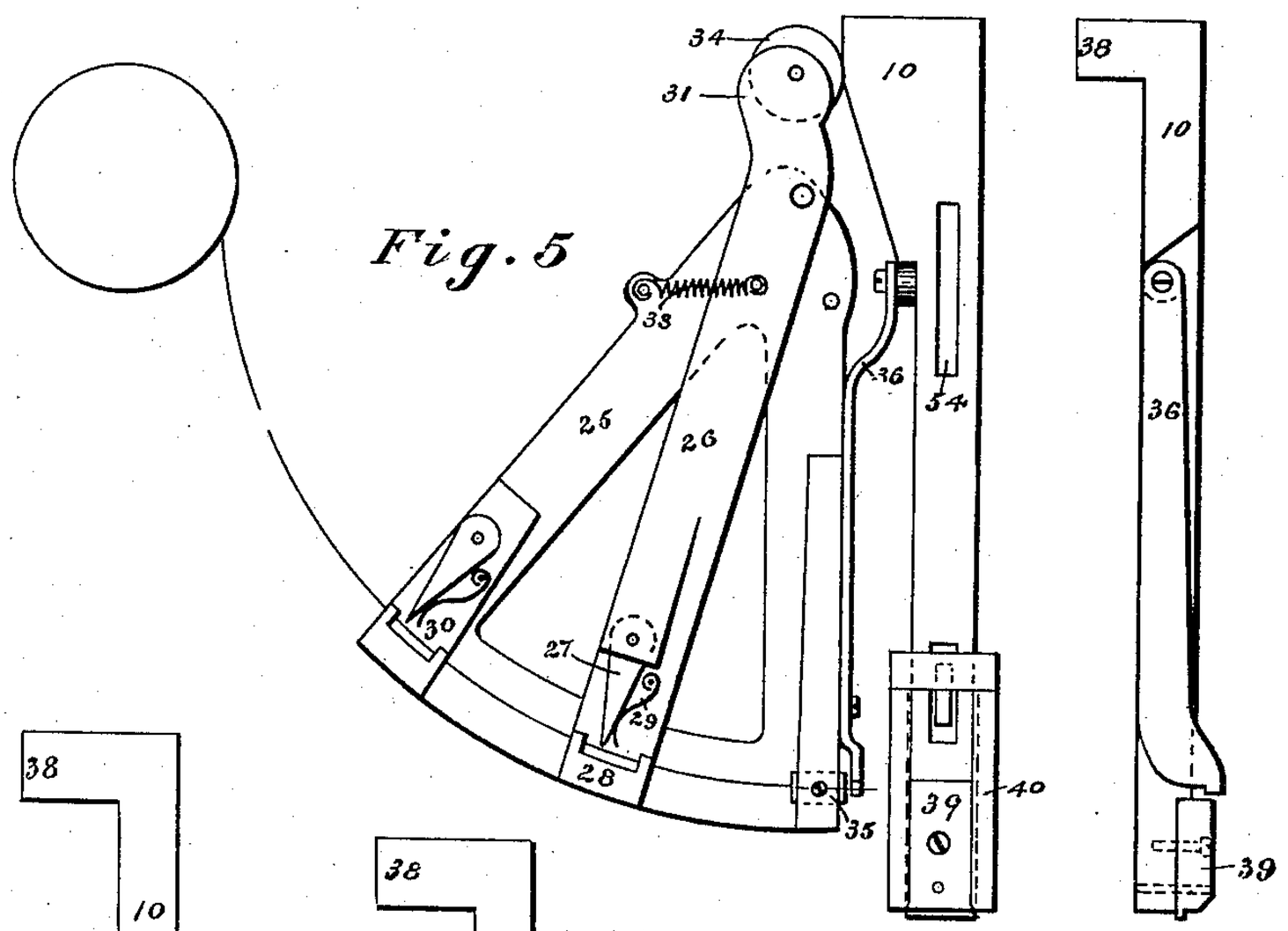

Fig. 5

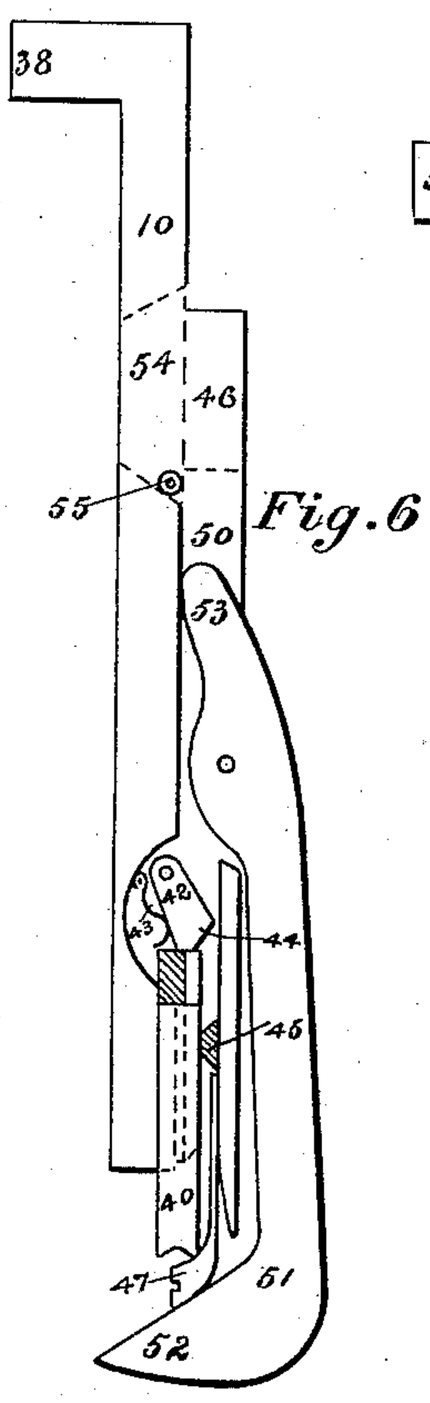

Fig. 6

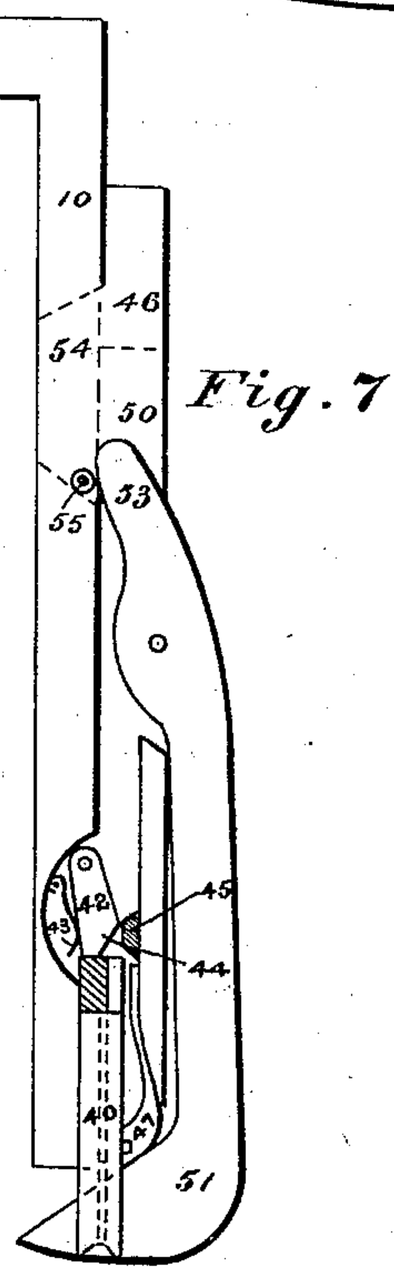

Fig. 7

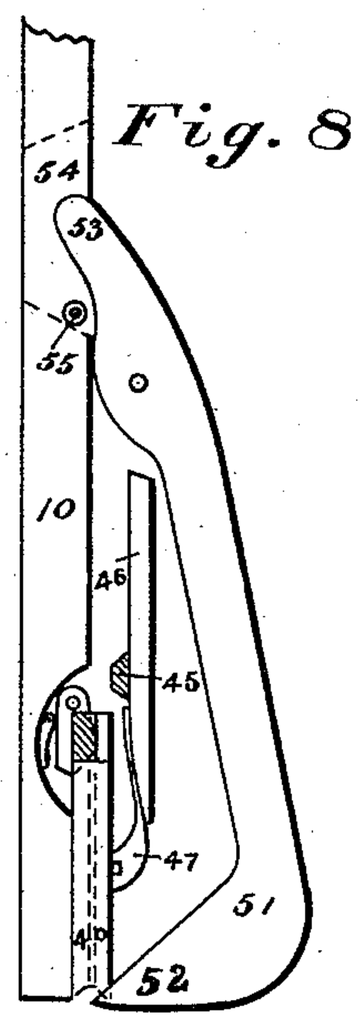

Fig. 8

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(No Model.) 4 Sheets—Sheet 4.

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WIRE STAPLE MAKING AND DRIVING MACHINE.

No. 472,516. Patented Apr. 12, 1892.

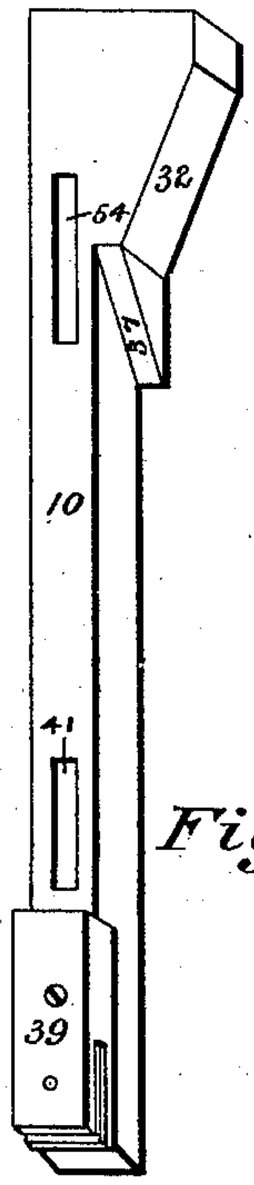

Fig. 9

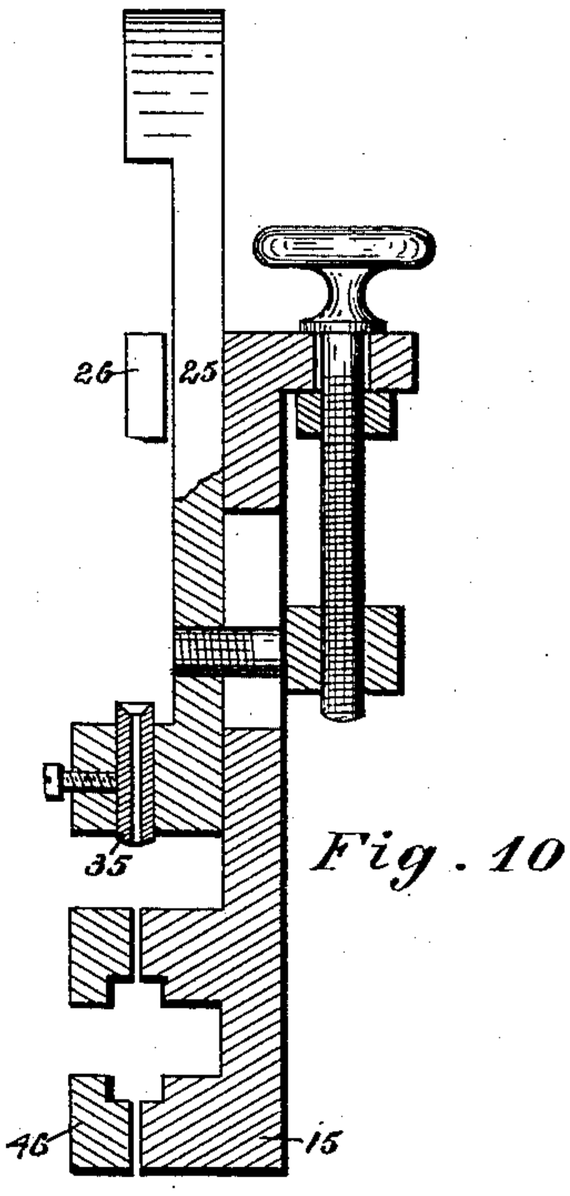

Fig. 10

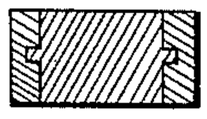

Fig. 11

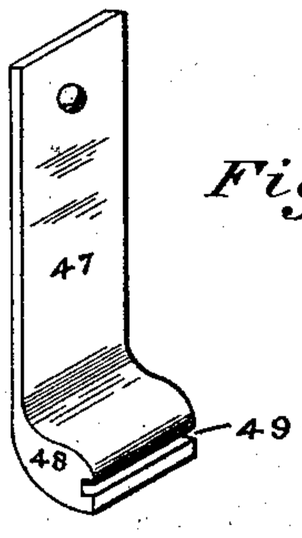

Fig. 12

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UNITED STATES PATENT OFFICE.

WILLIS E. ARNOLD, OF DANVILLE, ILLINOIS.

WIRE-STAPLE MAKING AND DRIVING MACHINE.

SPECIFICATION forming part of Letters Patent No. 472,516, dated April 12, 1892.

Application filed July 9, 1891. Serial No. 398,904. (No model.)

To all whom it may concern:

Be it known that I, WILLIS E. ARNOLD, of Danville, in the county of Vermilion and State of Illinois, have invented certain new and useful Improvements in Wire-Staple Making and Driving Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in wire-staple making and driving machines; and it consists in certain novel features hereinafter first fully described, and then pointed out in the claims.

In the annexed drawings, which fully illustrate my invention, Figure 1 is a perspective view of the complete machine. Fig. 2 is a side view of the same with a part of the supporting-frame broken away. Figs. 3 and 4 are detail views of the clinching mechanism. Fig. 5 is a perspective view, on a larger scale, of the driver and feed-arm and their connections. Fig. 6 is a detail view of the driver and the parts immediately contiguous thereto, the driver being in its highest position. Figs. 7 and 8 are similar views illustrating the driver about midway its stroke and in its lowest position, respectively. Fig. 9 is a perspective view of the driver. Fig. 10 is a view of the mechanism for adjusting the swinging frame. Fig. 11 is a detail sectional view of the driver and former, and Fig. 12 is a detail view of the anvil-block.

The supporting-frame of the machine consists of a hollow column or standard 1, rising from a suitable base 2, a hollow arm 3, projecting forward from the standard, and an open frame 4, secured to the upper end of the standard. In the base I arrange a treadle 5, which is depressed by the foot of the operator when the machine is in use and is held normally in its raised position by a spring secured thereto and to the inner side of the standard, as clearly shown. Within the standard and rising from the treadle is a pitman 7, which has its upper end pivoted to the lower end of a lever 8. The front end of this lever is pivoted to the lower end of a link 9, which has its upper end pivoted to the upper end of the driver 10, so that when the treadle is depressed the driver will be carried downward and the desired work performed. The rear end of the lever 8 is pivotally mounted on a pin projecting from the rod 11, and the rear end of a lever 12 is also pivoted on the said pin. Both ends of the rod 11 are threaded and thumb-nuts 13 14 are mounted thereon, so that by tightening one or the other of the nuts the pivot-pin carried by the rod may be raised or lowered and the head 15 (to which the lever 12 is connected) adjusted to the thickness of the material operated upon. The front end of the lever 12 engages between the lugs 16 on the rear side of the head 15, as clearly shown, and consequently the head will be caused to follow the movement of the end of the lever. By the arrangement of parts just described I am enabled to readily adjust the machine to the thickness of the material being operated upon without affecting the length of the stroke of the operating mechanism.

The pitman 7 is provided with an offset 17 at an intermediate point of its length, which bears upon the rear end of a lever or vibratory arm 18, pivoted within the arm 3 of the supporting-frame, so that as the treadle is operated the said vibratory arm will be oscillated. The front end of this vibratory arm is perforated, and the lower threaded extremity of the clincher-bar 19 passes through the perforation, nuts 20 21 being mounted on the said threaded extremity above and below the vibratory arm in order to permit the stroke of the same to be adjusted. The upper end of this clincher-bar will force the dogs 22 upward, thereby clinching the staple, and at the same time the slightly-rounded point of the clincher-bar will rise slightly higher than the dogs and cause the points to be embedded in the work. The dogs 22 are pivoted within the upper end of the arm 3 and are provided with recesses or notches 23 in their lower edges, which are engaged by the upper ends of the springs 24, secured to the inner sides of the said arm, so that they will be normally held in their lowered positions and automatically returned thereto after being operated.

To the front side of the head 15 I secure the wire holding and guiding frame 25, which projects laterally and supports and guides the wire to the staple-forming mechanism. The lower end of this frame is arranged to form

the arc of a circle, so as to hold the wire in the path traveled by the feed-arm 26, which is pivoted near its upper end to the upper end of the said frame and has its lower end provided with a pawl or dog 27, adapted to engage the wire and carry it forward. The lower end of the feed-arm is provided with a lip or ledge 28, over which the wire passes, and the dog is pivoted somewhat eccentrically above this lip or ledge, so that when the arm swings upward and outward the dog will pass smoothly over the wire, but when the arm swings inward and downward the dog will grip and bind the wire against the ledge, and thereby carry the same forward. A spring 29 is secured on the feed-arm and bears against the pawl, so as to throw the same outward and thereby insure the proper operation of the machine. The lower outer corner of the frame 25 is provided with a similar wire-gripping device 30 to allow the wire to pass readily forward, but prevent it from passing backward after it has been cut. The operator is thus assured of a sufficient length of wire to form the staple and can readily see when the available supply of wire has been exhausted. The feed-arm is provided at its upper end with a slight extension 31, which bears against an inclined portion or surface 32 on the driver, so that when the driver is thrown downward the feed-arm will swing inward and carry the wire to the staple-forming mechanism. The feed-arm is thrown outward as the driver rises by a spring 33, secured to the same and the frame 25.

In order to reduce the friction between the driver and the end of the feed-arm, I mount a roller 34 on the upper end of the said arm, which bears against the driver, as shown.

At the lower inner corner of the frame 25 I secure a short sleeve 35, through which the wire passes to the cutter and anvil and by which it is prevented from moving to either side. Just above the guide or sleeve 35 I pivot to the inner side of the frame 25 a knife 36, which is adapted to move across the end of the guide, and thereby cut the wire. This knife is operated by means of a lateral inclined suface 37 on the driver, which bears on the upper end of the knife, and thereby vibrates the same as the driver is raised or lowered. The leugth of wire cut off by the knife is regulated by adjusting the frame 25 to and away from the driver, the frame being pivoted to the head 15 for that purpose. By pivoting the feed-arm to the frame 25 at a point higher than the pivot of the head the length of stroke of the feed-arm is automatically changed as the frame is adjusted to cut a long or short wire.

10 designates the driver or driving-bar, which rests in the front side of the head 15 and is provided at its upper end, on its rear side, with the offset or lug 38, to which the upper end of the link 9 is pivoted, in order that the driver may be operated, as hereinbefore stated. On its front side, at its lower end, the driver is provided with the lifting-head 39, adapted to engage the staple-former and raise the same in the operation of the machine, as will be more fully set forth hereinafter. On one side the driver is constructed with the upwardly and outwardly projecting inclined surface 32, which operates the feed-arm, and just below this inclined surface 32 it is constructed with the upwardly and forwardly projecting surface 37, which operates the knife, as above mentioned.

The staple-former consists, substantially, of a U-shaped frame 40, having its sides engaging the sides of the former lifting-head 39 by means of a tongue-and-groove connection and its head lying in front of the driver over the lifting-head. When the former is lowered, the grooves in its sides will engage the ends of the cut-off wire and bend the same downward to form the staple. Above the lifting-head the driver is provided with a recess 41, in which I pivot a dog 42, which is adapted to engage the upper end of the former, and thereby push the same downward as the driver descends. The dog is pressed outward by a spring 43, secured in the recess in rear of the dog, and its lower end is provided with a beveled face 44, which is adapted to impinge against the stop 45 on the face-plate 46 and be thereby disengaged from the former when the driver is lowered, so that the staple will be ejected from the former and fastened in the material to be secured. The face-plate 46, just mentioned, is a part of the head 15 and lies in front of the driver to hold it in position. The lower end of the face-plate is reduced and the anvil-block 47 is secured thereto. This anvil-block consists of a spring-plate secured at its upper end to the inner face of the face-plate and having its lower end enlarged and turned inward, as shown at 48. This enlargement 48 is provided with a transverse groove 49 in its edge, which receives the wire as it is cut off and holds it in position to be engaged by the staple-former. At about the center of the face-plate there is a vertical longitudinal slot 50, in which I pivot the staple-supporter 51, which extends downward in front of the face-plate and the driver and has its lower end turned inward, as shown at 52, to provide a tooth which is adapted to enter between the legs of the staple and thereby prevent the bending of the same until after they have entered the material being operated upon. The upper end of the staple-supporter forms a finger 53, which plays in a slot or recess 54 in the driver, so that the said supporter will be caused to swing in and out as the driver ascends and descends. The lower edge of the finger is of a somewhat irregular shape and rests against a roller or cam 55 in the lower end of the recess 54, so that the supporter cannot swing from under the staple too rapidly.

The construction and arrangement of the several parts of my improved machine will be fully understood from the foregoing description, and the operation of the same is

thought to be clear. The materials to be stitched or fastened together are placed over the upper end of the arm 3 and held in that position under the driver. The treadle is depressed, thus drawing the driver downward and operating the machine. As the treadle is depressed the lateral pin on the pitman will push the inner end of the vibratory arm downward, and thus cause the outer end of the same to swing upward and push the clinching-bar into position to clinch the ends of the staple as they emerge from the under side of the material, the extremity of the bar being provided with a point to slightly embed the ends of the staple in the work. As before stated, as the driver descends the feed-arm will swing inward and feed the wire through the guide into the groove in the lower edge of the anvil-block. When the feed-arm has reached the inner limit of its motion, it will remain stationary momentarily, and at the same instant the knife will have completed its vibration and pass over the wire, so as to cut the same. On the upward stroke of the driver the knife will resume its initial position, (which is accomplished by a spring, not shown,) so as to leave the end of the guide open for another length of wire to pass therethrough, and the feed-arm will swing outward, so as to again grip the wire and feed another portion thereof forward on the succeeding downstroke of the driver. On the second downstroke of the driver the length of the wire left in the lower end of the anvil-block will be engaged by the staple-former and the ends of the same bent down so as to form the staple, the anvil being pushed out of the path of the former by the driver-head 39, as will be readily understood upon reference to the drawings. The dog engaging the former will now be brought against the stop on the face-plate, and thereby automatically disengaged from the former, so that the continued downward movement of the driver will cause the lifting-head to impinge upon the staple and expel it from the former and at the same time force it into and through the work, the staple-supporter moving from under the staple as it is forced downward by the lifting-head, and thus serving to hold the shoulder of the staple firm and straight. After the staple has been thus driven home the treadle is released and the several parts are then returned to their initial positions by the spring within the hollow standard. When the driver rises, the lifting-head will engage the staple-former and thereby raise the same, and the resiliency of the anvil-block will then force it outward into the path of the former, thus arranging the machine to form and drive another staple. The former operation is then repeated, as will be readily understood.

The advantages of my improved machine are thought to be obvious from the foregoing description, taken in connection with the accompanying drawings, and comment thereon is deemed unnecessary.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination of the head, the driver, the supporting-frame, the lever engaging the head and pivoted on the supporting-frame, the lever pivotally connected with the driver and having its end pivoted to the end of the first-mentioned lever, and suitable operating mechanism.

2. The combination of the supporting-frame, the vertically-adjustable rod mounted thereon, and the levers having a common pivotal connection with the said rod and adapted to operate the head and the driver.

3. The combination of the supporting-frame, the dogs pivoted thereon, the clinching-bar having a beveled upper end and arranged below and between the dogs, and suitable operating mechanism.

4. The combination of the wire-holding frame, the feed-arm pivoted thereon, and the driver arranged adjacent to the wire-holding frame and provided near its upper end with an inclined surface moving over the upper end of the feed-arm to vibrate the same.

5. The combination of the wire-holding frame, the feed-arm pivoted thereon, the knife pivotally mounted on the side of the wire-holding frame, and the driver provided with inclined surfaces adapted to operate the feed-arm and the knife by moving over the upper ends of the same.

6. The combination of a vertically-moving driver, a laterally-swinging feed-arm operated by the driver, and a knife swinging at right angles to the feed-arm and also operated by the driver.

7. The combination of the wire-holding frame, the guide at the lower inner corner of the same, the feed-arm pivoted to the wire-holding frame and having its lower end swinging to and away from the said guide, the knife pivoted to the said frame and vibrating across the guide, and suitable operating mechanism.

8. The combination of the driver, the anvil normally projecting under the lower end of the driver, and the vertically-movable staple-former mounted on the lower end of the driver and adapted to take the wire from the anvil and form the staple.

9. The combination of the driver, the anvil, the lifting-head at the lower end of the driver, and the vertically-movable staple-former mounted on the lifting-head.

10. The combination of the driver, the staple-former on the lower end of the same to form the staple, the lifting-head, and the staple-supporter.

11. The combination of the driver, the face-plate provided with a stop, the lifting-head at the lower end of the driver, the staple-former mounted on the said lifting-head, and the dog mounted within the driver above the staple-former and adapted to engage the upper end of the same and be released therefrom by the stop on the face-plate.

12. The anvil-block consisting of a spring-plate having an enlargement at its lower end, provided with a transverse groove in its edge.

13. The combination of the face-plate, the driver having a recess, and a cam in the lower end of the said recess, and the staple-supporter pivoted in the face-plate and having its upper end playing in the recess in the driver and resting on the cam at the lower end of the said recess.

14. The combination of a driver, a lifting-head at the lower end of the same, a staple-former mounted on the lifting-head, a dog carried by the driver and adapted to engage the upper end of the staple-former, a spring-anvil adapted to hold the wire in the path of the staple-former, and a staple-supporter operated by the driver and adapted to support the staple within the staple-former.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

WILLIS E. ARNOLD.

Witnesses:
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H. F. DICE.