May 27, 1924. 1,495,508

A. C. CAMPBELL

MACHINE FOR FEEDING WIRE

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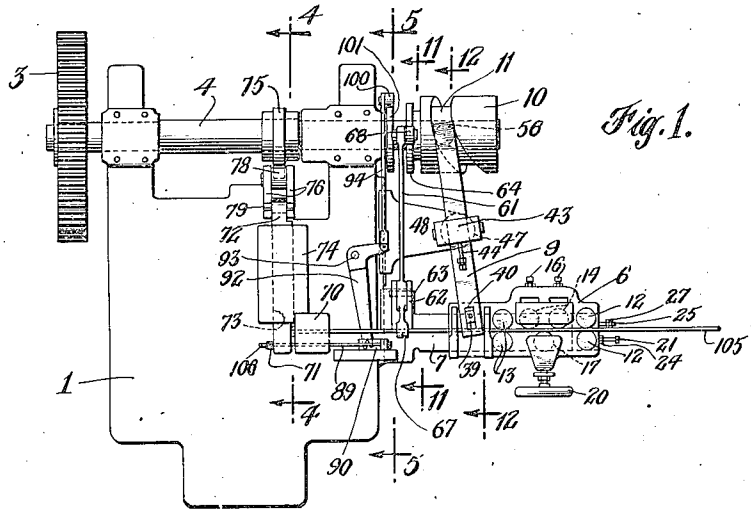


Fig. 1.

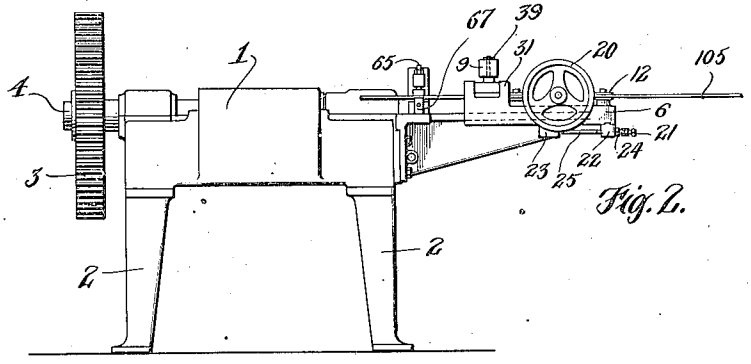


Fig. 2.

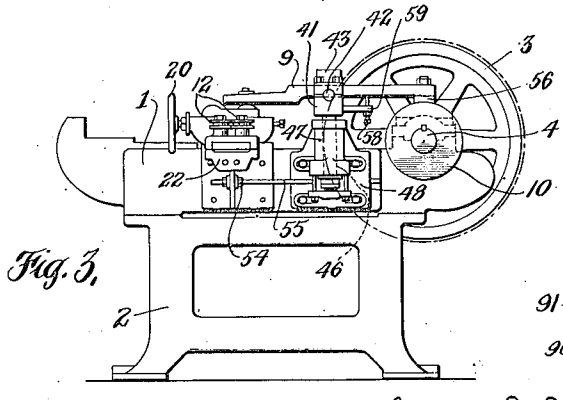


Fig. 3.

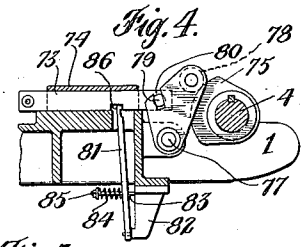


Fig. 4.

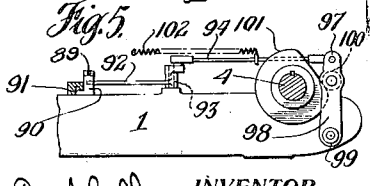


Fig. 5.

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A. C. CAMPBELL

MACHINE FOR FEEDING WIRE

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Fig. 7.

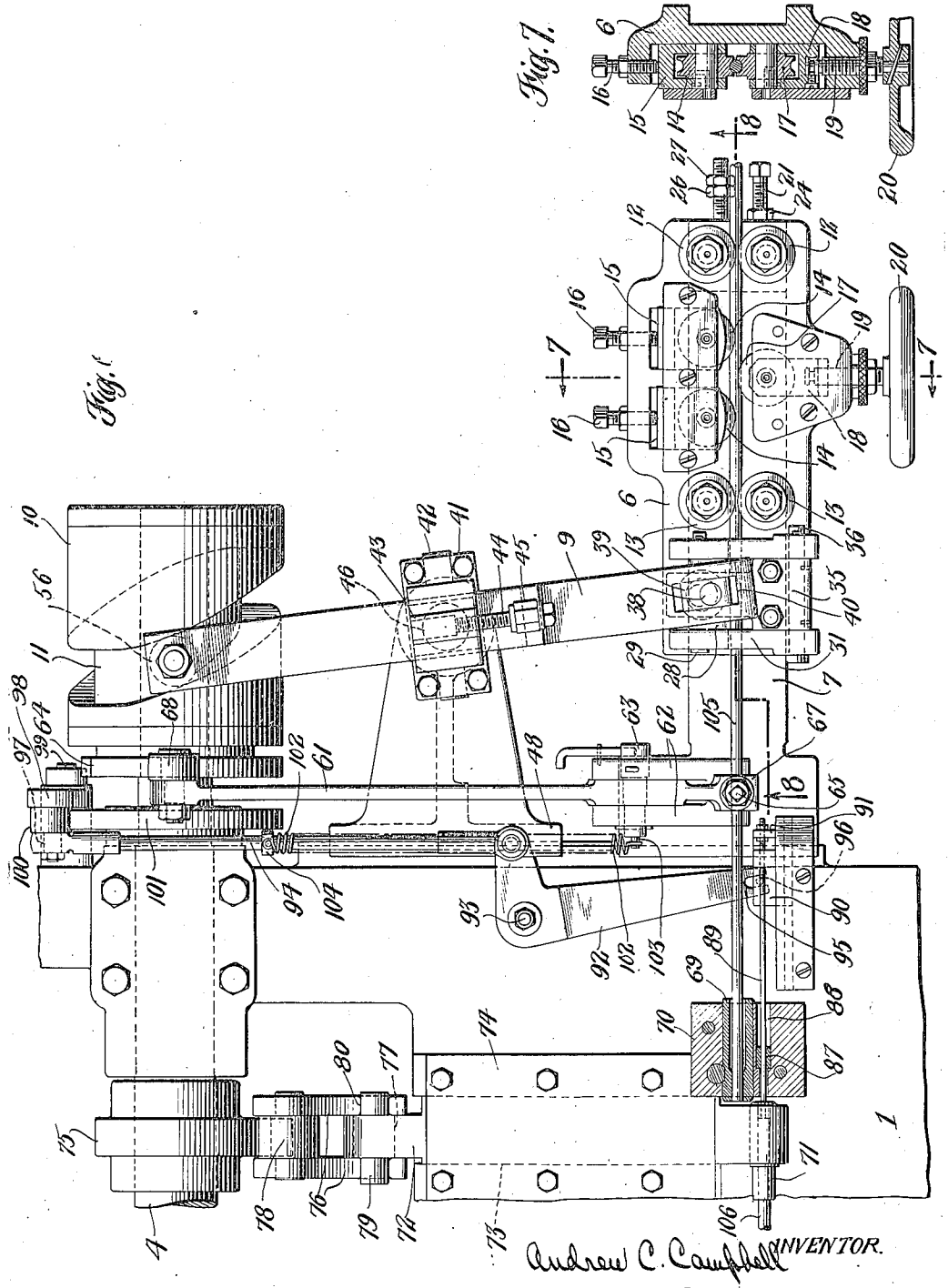


Fig. 1.

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MACHINE FOR FEEDING WIRE

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Fig. 8.

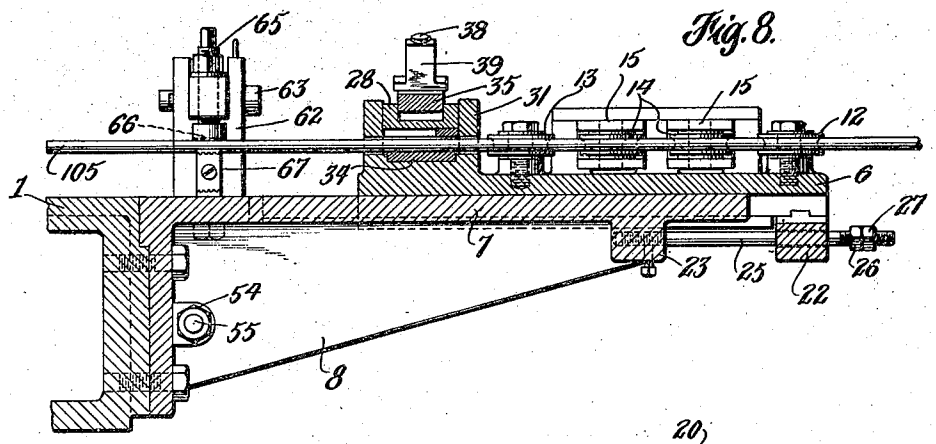


Fig. 9.

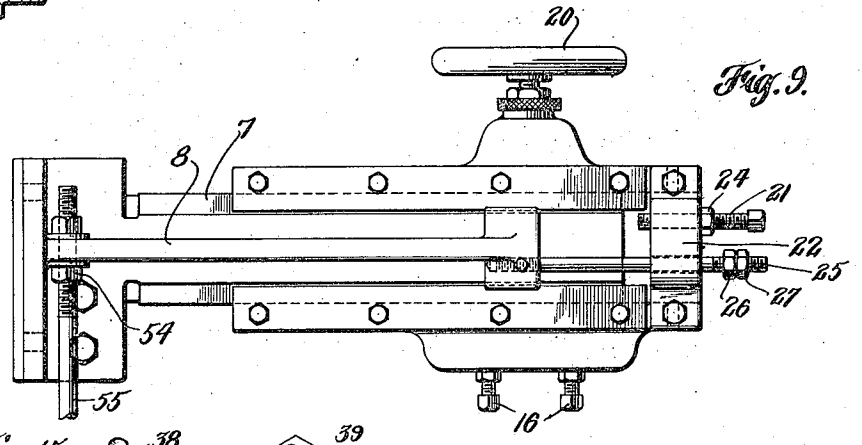
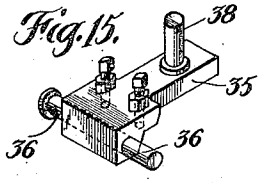


Fig. 15.



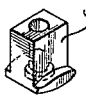


Fig. 16.

Fig. 17

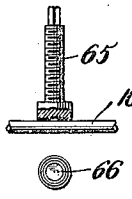


Fig. 18.

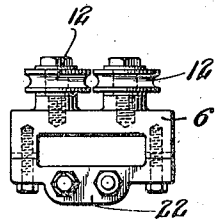
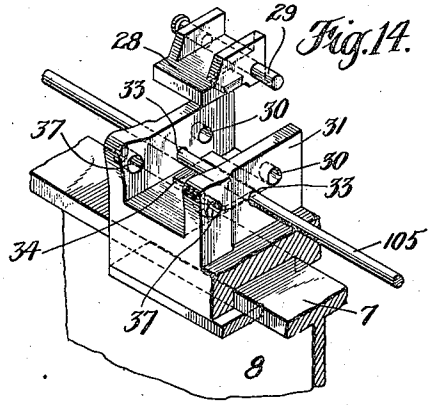


Fig. 10.

Fig. 14.



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Fig. 11.

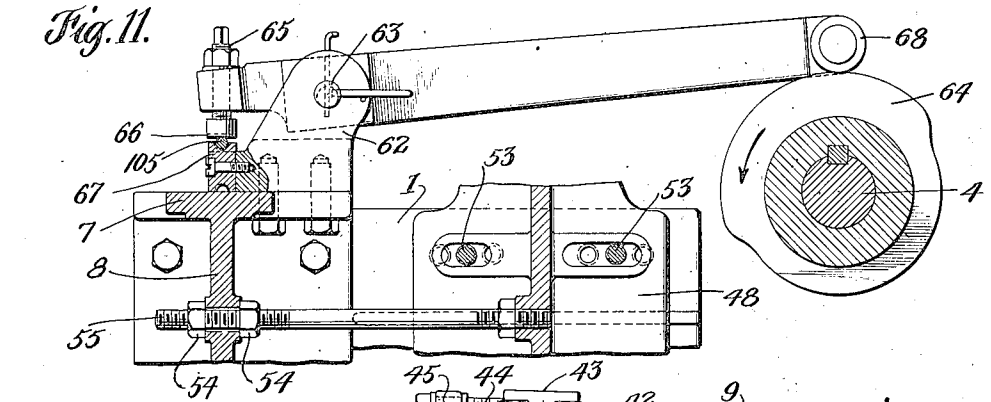


Fig. 12.

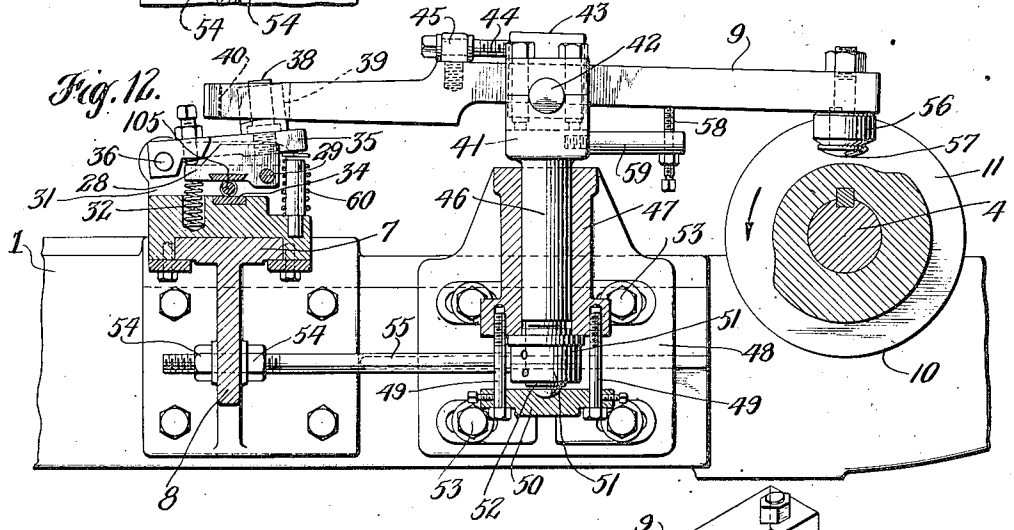
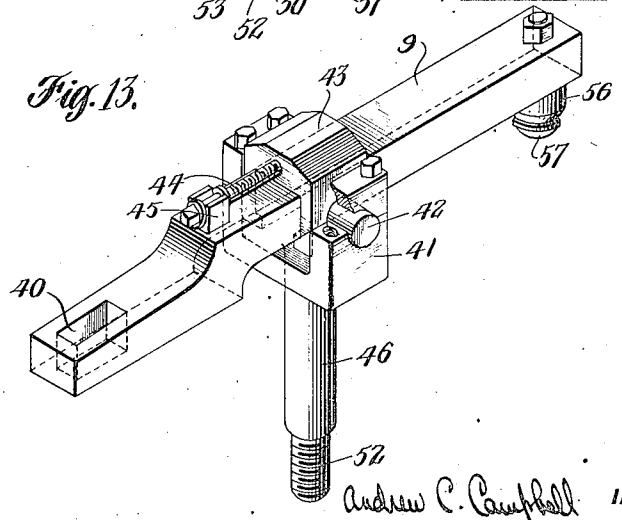


Fig. 13.



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Patented May 27, 1924. 1,495,508

UNITED STATES PATENT OFFICE.

ANDREW C. CAMPBELL, OF WATERBURY, CONNECTICUT.

MACHINE FOR FEEDING WIRE.

Application filed November 3, 1921. Serial No. 512,407.

To all whom it may concern:

Be it known that I, ANDREW C. CAMPBELL, a citizen of the United States, residing at Waterbury, in the State of Connecticut, have invented certain new and useful Improvements in Machines for Feeding Wire, of which the following, taken in connection with the accompanying drawings, is a specification.

This application is a continuation in part of my copending application Serial No. 402,427, filed August 9, 1920.

The invention relates to machines or mechanisms for feeding wire and there may be incorporated in the mechanism means for cutting the wire into blanks and causing them to be deposited in a predetermined position such, for example, as feeding wire and cutting off blanks for use in a chain forming machine.

One of the objects is to provide a machine of the above described character which will be characterized by a positive and uniform feed of the wire stock and which may be employed if desired without the use of abutting stops.

Another object is to provide such a machine which shall be characterized by adaptability for accurate adjustment to vary the length of wire fed at each cycle of operations.

Another object is to provide a mechanism of this character which shall be characterized by rapid and accurate feeding of blanks following the completion of the shearing operation.

Another object is to provide a machine whereby wire may be fed and blanks cut off which are particularly adaptable with respect to uniformity of size and configuration of the ends for being formed into chain, more especially chain which is to be electrically welded.

A further object is to provide a machine for the general purpose above described that may be adjusted to operate on various sizes of wire.

Other objects which I desire to accomplish will be more particularly pointed out hereinafter in connection with the description of the machine.

I have shown the invention as embodied in a single form only, but it is to be understood that the form shown is an illustrative embodiment merely and that variations and modifications may be made that will nevertheless be within the scope of the invention as defined by the claims hereto appended.

Referring to the drawings:

Figure 1 is a plan view of the machine.

Figure 2 is a front view of the machine.

Figure 3 is an end view of the machine.

Figure 4 is a view in section on the line 4, 4 of Figure 1.

Figure 5 is a view in section on the line 5, 5 of Figure 1.

Figure 6 is an enlarged plan view showing the operating mechanism in detail and detached from the bed of the machine.

Figure 7 is a view in section on the line 7, 7 of Figure 6.

Figure 8 is a view in section on the line 8, 8 of Figure 6.

Figure 9 is a bottom view of the feeding carriage and its supporting bracket.

Figure 10 is a detail view of the projecting end of the bracket on which the feed carriage operates and showing a pair of straightening rolls.

Figure 11 is a view in section on the line 11, 11 of Figure 1.

Figure 12 is a view partly in section on the line 12, 12 of Figure 1.

Figure 13 is a detail isometric view of the lever which operates the feed carriage together with pivoted bearing.

Figure 14 is an isometric view of the mounting for the compound lever system.

Figure 15 is a detail view of the primary member of the compound lever system.

Figure 16 is a detail view of the pivotal mounting for the feed lever.

Figure 17 is a detail view of the tool which is operated to clamp the wire and prevent the same from being withdrawn upon retraction of the feed carriage.

Figure 18 is a view of the face of the last mentioned tool.

Although the mechanism herein described and claimed is especially adaptable for feeding wire and cutting off blanks therefrom and placing them in proper position to be operated upon by a chain forming machine, nevertheless, since it is also adaptable for feeding wire and cutting off blanks and positioning the same for any purpose for which they may be useful, I have not shown the mechanism in combination with mechanism adapted for any specific purpose.

Referring to the drawings, the support for the operating parts may comprise a bed 1 provided with a supporting frame 2.

Power may be received through any convenient means, such as the gear 3 which may be mounted on the shaft 4, this shaft in turn communicating motion to the tools and parts which directly operate upon the wire. Suitable means for straightening and intermittently feeding the wire stock are provided, which may consist of the carriage 6 with its accompanying actuating mechanism, the carriage being slidably mounted on the guideway 7 supported by the bracket 8 extending outwardly from the frame. Since the carriage is slidably mounted on the guideway, it may be caused to reciprocate by suitable means for imparting power thereto which I have shown as consisting of the feed lever 9 mounted to oscillate in a substantial horizontal plane and also as required in a substantial vertical plane both motions being effected by the cam cylinder 10 provided with the cam path 11 which is cut in such form as to produce the required motions. To properly straighten the wire as it is fed, I provide a pair of cooperating rolls 12, 12 near one end of the carriage and another pair of cooperating rolls 13, 13 at the other end of the carriage, all of the said rolls having peripheral grooves of suitable dimensions to accommodate wire of the particular size upon which it is desired to operate. In addition to the two pairs of rolls above mentioned, another set of rolls may also, if desired, be provided comprising the rolls 14, 14 which are mounted in roll slides 15, 15, the roll slides being slidable on the carriage transversely thereof and being adjustable transversely thereof by means of the set screws 16, 16 threaded in the frame of the carriage as shown in Figure 7. To cooperate with the rolls 14, 14, I also provide another roll 17 which is in the same manner mounted in a roll slide 18 also slidably mounted so that it is movable transversely of the carriage and adjustable to any desired position by means of the set screw 19 which may be operated by the hand wheel 20.

A positive stop to the forward or feeding stroke of the carriage is desirable and may comprise the set screw 21 threaded through the block 22 depending from the carriage and is adapted to bring the carriage to a stop in its forward motion when the tip of the set screw strikes the block 23 depending from the bracket 8. Adjustment of the set screw 21 is effected in the usual manner by turning it to the right or left, as desired, and may be secured against turning in any desired position by the lock nut 24. A positive limit to the rearward stroke of the carriage is also desirable and may be effected by the bolt 25 which projects from the depending block 23 and extends slidably through a bore in the dependent block 22. The limit of the rearward movement of the carriage may be varied by turning the nut 26 and the nut 26 may be locked by the nut 27.

By providing positive stops to the motion of the carriage in both directions, I eliminate the possibility of inaccuracy in cutting to proper length which might, in the absence of the stops, result from the natural resiliency of the parts and inaccuracies of adjustment in mounting. This is a particularly important object in feeding wire for machines which form chain which is to be electrically welded.

For securely retaining the wire so that it will move with the carriage during the forward or feeding stroke, I provide a power multiplying leverage system adapted to be operated by the vertical motion of the feed lever 9. The leverage system may comprise two members of which the lower or secondary member 28 is pivoted by means of the journals 29 in the bearings 30 of the upstanding brackets 31 and is normally maintained in elevated position by any suitable means such as the spring 32. The wire passes through the series of straightening rolls hereinabove described and thence through the wire holes indicated at 33, 33 in the brackets 31, 31 and, therefore, when the lever 28 is depressed the wire is clamped between the lower side of that lever and the upper surface of the hardened block 34. The lower member 28 is in turn operated by the primary or upper member 35 pivotally mounted by means of the journals 36, 36 in the bearings 37, 37 in the brackets 31, 31 and working on the free end of the lower lever as shown in Figure 12. It is thus obvious that any pressure applied to the free end of the primary member 35 of the leverage system is multiplied at the point of contact of the secondary member 28 with the wire to an extent varying with the ratios of the leverage system. A suitable pivotal connection for the operating end of the lever 9 may consist of the pin 38 projecting from the member 35 and the block 39 pivoted on the pivot 38, the latter serving as a bushing to slidably fit in the slot 40 of the lever 9. As the bottom of the cam path 11 is shaped to cause a sufficient depression of the forward end of the feed lever 9 during the feeding stroke of the carriage to actuate the compound leverage system above described thereby clamping the wire, the wire advances during the feeding stroke of the carriage a distance represented by the length of the feeding stroke.

The fulcrum on which the feed lever 9 swings in the vertical component of its motion may consist of the forked brackets 41, 41 in which are pivoted the trunnions 42, 42 extending from the yoke 43 in which in turn the feed lever is mounted and wherein the feed lever may be moved longitudi-

nally of itself for purposes of adjustment. The feed lever 9 may be secured in longitudinal adjustment by any convenient means, such as the set screw 44 revolvably mounted against longitudinal displacement in the bearing 45 on the feed lever and threaded in the yoke 43.

The mounting of the feed lever may be adapted to permit horizontal oscillation of the lever by suitable means, such as by mounting the brackets 41, 41 on a spindle 46 as shown in Figure 13. The spindle is in turn revolvably mounted in a bearing 47 supported by the bracket 48 affixed to the frame. Depending from the bracket 48 and supported by the bolts 49, 49 is the step 50 which may act as a thrust bearing for the spindle 46. Counter thrust to the upward motion of the spindle may be effected by any convenient means, for example, by means of the swivel nuts 51, 51 threaded on the spindle 46 at the threaded portion 52 of the spindle. The position of the fulcrum for both the vertical and horizontal motion of the feed lever 9 may be changed by loosening the bolts 53, 53 which secure the bracket to the machine and then moving the bracket by turning the nuts 54 on the rod 55 one way or the other as occasion requires. The rod 55 is fixedly attached at one end to the bracket 48, but is freely slidable through an aperture in the bracket 8. The feed lever may, if desired, be operated against the side walls of the cam path 11 through the medium of the roll 56 and against the bottom of the cam path through the medium of the roll stud 57.

A positive stop to the downward motion of the rearward arm of the feed lever 9 is desirable for the purpose of adjustment and is provided in the form of a set screw 58 threaded in the arm 59. The feed lever is normally pressed against the set screw 58 by the spring 60 which presses upwardly against the primary member 35 of the leverage system.

As the feed carriage reaches the limit of its feeding stroke and the wire is released from the grip of the compound leverage system on the feed carriage and the carriage proceeds with its return stroke, the length of wire which has been fed would be carried back for a part or under extreme conditions possibly the entire distance of the return stroke of the feed carriage were not means provided to secure the wire in the position reached at the end of the feed stroke. Means for the latter purpose are provided in the form of the wire clamping lever 61 (Figure 6) pivotally mounted between the brackets 62 by means of the shaft 63 and caused to oscillate in a vertical plane by the peripheral cam 64. The working face of this lever may consist of a screw 65 having a serrated face 66 and the lever connections are adjusted so that the working face 66 will be substantially in the vertical plane of the wire line and will be caused to pinch the wire when the lever is actuated by the cam 64, the block 67 serving to oppose the pressure. The peripheral cam 64 is so shaped with relation to the cam 11 that, as the feed carriage reaches the limit of its feed stroke, the wire clamping lever 61 will jam the wire and retain it firmly until the feed carriage has reached the limit of its rearward stroke. The wire clamping lever may be provided with an anti-friction roller 68 adapted to ride on the cam 64.

Suitable means for cutting off the blanks are provided. As the straightened wire is fed forwardly, it is directed through a cut-off mechanism (see Figure 6) which may comprise the quill 69 mounted in a block 70 attached to the bed and the quill 71 carried by the cut-off slide 72, the cut-off slide being in retracted position with the two quills in alignment as the wire is being fed. The cut-off slide 72 may be slidably mounted in order that it may be capable of longitudinal motion in a groove indicated by the dotted lines 73 (Figure 6) in the bed, the groove being covered by a cover plate 74.

Forward longitudinal motion of the cut-off slide may be imparted by the peripheral cam 75 mounted on the shaft 4 through the medium of two bell crank levers 76, 76 (see Figures 4 and 6) mounted to rock on the shaft 77 and carrying between them the roller 78 which rides on the face of the cam 75. The bell crank levers 76, 76 may be pivotally connected with the cut-off slide 72 by means of the shaft 79 revolvably mounted in the cut-off slide and having flattened ends which slidably connect with the slots 80, 80 (only one of which is shown as in Figure 4) of the bell crank levers 76, 76.

The roller 78 is normally maintained against the cam 75 and consequently the cut-off slide is normally maintained in its rearward position by any convenient means, such as the pressure of the lever 81 (Figure 4) pivoted to a bracket 82 depending from the bed. Through an aperture in the lever passes the rod 83 which extends from the bracket 82 and which in turn carries the spring 84 which bears against the lever 81 and also against the nut 85. The upper end of the lever extends into a transverse slot 86 in the cut-off slide and constantly tends to press the cut-off slide rearwardly. The cam 75 is so cut during the operation of feeding the wire that the cut-off slide 72 is stationary, the cut-off quills 69 and 71 being in alignment with each other; but as soon as the feeding operation has ceased, the slide will move forward, cutting off the blank and carrying it forward to proper position for being expelled from the quill 71.

A suitable and convenient mechanism for

expelling the blank from the quill 71 is as follows: The block 70 is provided with a guideway consisting of the bearing 87 closely fitted in the bore 88, the bearing being so positioned that it will register with the quill 71 when the latter is in its extreme forward position. The push rod 89 is provided and adapted for reciprocatory movement in the bearing 87. Its rear end is guided by being fixed in the slide 90 which in turn is adapted to slide back and forth along the guideway 91 (see Figure 5). Reciprocatory motion of the slide 90 and, consequently, of the push rod, is effected by rocking the bell crank lever 92 pivoted to the bed by the pivotal mounting 93 and caused to rock on the pivot by the longitudinally reciprocating motion of the rod 94. The bell crank lever 92 is forked, as shown at 95, the fork operating on the pin 96 (shown in dotted lines, Figure 6). The push rod 94 is pivotally connected at 97 with the lever 98 which in turn is pivoted to a fixed portion of the frame at 99 and which is also provided with an anti-friction roller 100 (shown in dotted lines, Figure 5) adapted to ride on the peripheral cam 101 mounted on the shaft 4. The shape of the path of the cam 101 is such that, during the feeding stroke of the carriage and the forward motion of the cut-off slide, the push rod 89 is in its retracted position, but, that when the feeding stroke is ceased and the quill of the cut-off slide has registered with the guideway 87, the push rod 89 may be projected through the quill 71 which carries the blank whereby the blank may be expelled from the quill 71. As the forward thrust of the push rod 89 should be quickly effected, the cam is not depended upon for this purpose, but a spring 102 is made use of, one end of the spring being attached to a relatively fixed portion of the machine such as the stud 103 and the other end being attached to a collar 104 fixed on the push rod 94.

The principles and mode of operation of the machine and its various parts are as follows:

Assume that the parts are in the position shown in Figure 6 wherein the feed carriage has nearly reached the limit of its rearward motion. At this point the wire 105 is free from the pressure of the compound leverage system but is firmly clamped by the wire clamping lever 61. The push rod 89 at this point projects slightly into the quill 71 and is under the action of the spring 102 which causes it to eject the blank 106. The cut-off slide and, consequently, the cut-off quill 71 are in their forward position, the quill 71 registering with the guide 87 so that the push rod 89 may freely project into it. Continuing the cycle of operations, the feed carriage completes its rearward stroke whereupon the compound leverage system comes into operation firmly clamping the wire and simultaneously therewith the wire binding clamp operated by the lever 61 is released, the mechanism now being ready for its forward feed. Just before the forward feed commences, however, the slide 72 reaches its rearward position under the action of the lever 81 and spring 84 so that the quill 71 registers with the quill 69. Before the withdrawal of the slide, the push rod 89 has been withdrawn from the quill 71 to permit of the retraction of the slide. With the slide 72 in retracted position the feed carriage proceeds with and continues the feeding of the wire through the quill 69 and the then registering quill 71. At the completion of the feed stroke, the wire clamping lever clamps the wire 105 and simultaneously therewith the compound leverage system is released. At or immediately following the completion of the feed stroke, the forward motion of the slide 72 begins, thus cutting off a blank and carrying it forward to a position in alignment with the push rod 89. This forward motion of the slide 72 takes place during the return stroke of the feed carriage. When the quill 71 has been brought into alignment with the push rod 89, the latter is quickly projected into the quill 71 by the action of the spring 102 and the blank ejected, thus completing a cycle of operations.

It may be desired, frequently, to adjust the machine for cutting blanks of various lengths and this object may be carried out by means of various adjustments of the feed lever. For instance, the time when the compound leverage system comes into operation may be varied within sufficient limits by moving the bracket 48 to the right or left (considered with reference to Figure 12) as occasion requires. Moving the bracket to the left will retard the clamping action for the reason that it will retard the time of operation of the cam 11. Moving the bracket to the right will, of course, have the contrary effect. It should be noted that the slot 40 in the lever 9 is made of sufficient length to permit of this adjustment. If it is desired to change the ratio of the arms of the lever 9 in order to vary the length of feed of the wire, the screw 44 may be turned to the right or left as desired thus causing the lever 9 to slide through the yoke 43 and its fulcrum to be moved. In order to bring about a combination of these two adjustments the fulcrum adjustment may first be made by means of the screw 44 and then the timing adjustment be made by moving the bracket 48, or the combination adjustment may be made by reversing the two processes.

To vary the pressure on the wire or to accommodate the mechanism to wire of varying sizes, the spindle 46 and, consequently, the vertical position of the trunnions 42, may

be raised or lowered as occasion requires by turning the screws 49 accordingly. Adjustment of the force applied by the clamp may be made by turning the screw 65 to the right or left as circumstances require.

It will be apparent from a consideration of the principles of my invention that the same may be embodied in a variety of forms all of which are intended to be included in the following claims:

1. In machines for feeding wire, a wire feed mechanism consisting of a carriage movable longitudinally with relation to the wire, mechanism for positively reciprocating the carriage, a power-multiplying lever carried by the carriage and movable in an arc passing through the wire line, mechanism for depressing the lever during the feed stroke of the carriage, and independent mechanism for clamping the wire at the completion of the feed stroke and retaining it during the return stroke.

2. In machines for feeding wire, a wire feed mechanism consisting of a carriage movable longitudinally with relation to the wire, mechanism for positively reciprocating the carriage, a compound power-multiplying lever carried by the carriage and movable in a plane passing through the wire line, means for normally maintaining said lever in retracted position with respect to said wire line, mechanism for actuating the lever against the wire line during the feed stroke of the carriage, a stationary member against which the wire may be jammed by said lever, and independent mechanism for clamping the wire at the completion of the feed stroke and retaining it during the return stroke.

3. In machines for feeding wire, a feed carriage carrying a power-multiplying wire clamping lever, a feed lever one end of which bears on the free end of said wire clamping lever, a fulcrum for said feed lever located intermediate the ends thereof, means for raising and lowering said fulcrum and for maintaining it in a predetermined position, and means cooperating with the opposite end of said feed lever and adapted to impart oscillatory motion thereto.

4. In machines for feeding wire, a feed carriage carrying a power-multiplying wire clamp, a feed lever for said carriage one end of which cooperates with said clamp, a fulcrum for said feed lever located intermediate the ends thereof, means for adjusting said fulcrum to a predetermined position, and means cooperating with the opposite end of said feed lever and adapted to cause it to oscillate on said fulcrum, and thereby to actuate said clamp.

5. In machines for feeding wire, a feed carriage carrying a power-multiplying wire clamp, a feed lever for said carriage one end of which is connected with said clamp whereby the same may be actuated, a fulcrum for said lever comprising a revolvably mounted vertical shaft terminating at its upper end in brackets between which said lever is pivotally mounted, a step for said shaft, means for adjusting the position of the step in a vertical direction, adjustable means for preventing the shaft from rising from the step, and means for cooperating with the opposite end of said feed lever to cause it to oscillate on said fulcrum and thereby to actuate said clamp, and also simultaneously to cause the carriage to advance, thereby clamping the wire and feeding it at the same time.

6. In machines for feeding wire, a feed carriage carrying a power-multiplying wire clamp, a feed lever for said carriage one end of which is operatively connected with said clamp, a fulcrum for said feed lever located intermediate the ends thereof and whereby said lever may be oscillated in both a vertical and a horizontal plane, said fulcrum consisting of a revolubly mounted vertical shaft terminating in brackets between which said lever is pivotally mounted, adjustable means for preventing vertical motion of said shaft, and means for causing said lever to oscillate in both a vertical and horizontal direction.

7. In machines for feeding wire, a slidably mounted feed carriage, a power-multiplying lever mounted thereon and adapted to oscillate in a sector intersecting the wire line, means for imparting reciprocatory motion to said carriage, means for actuating said lever during the feeding stroke of the carriage and means for retaining the wire during the return stroke of the carriage in the position occupied by it at the end of the feeding stroke.

8. In machines for feeding wire, a feed carriage slidably mounted for reciprocatory motion and provided with a power-multiplying lever pivoted thereon and adapted to exert pressure against a section of wire leading through said carriage in the wire line, means for imparting reciprocatory motion to said carriage and for actuating said lever against the said wire during the feeding stroke of the carriage and for retracting the said lever during the return stroke of said carriage, a clamp adapted to retain the wire in fixed position during the return stroke, and means for actuating said clamp.

9. In machines for feeding wire, a slidably mounted feed carrige, a compound power multiplying lever mounted thereon, positioned and adapted to exert pressure transversely of the wire line, means for opposing the pressure of said lever, means for imparting reciprocatory motion to said carriage, means for actuating said lever during the feeding stroke of the carriage, and means for retaining the wire during

the return stroke of the carriage in the position occupied by it at the end of the feeding stroke.

10. In machines for feeding wire, a slidably mounted feed carriage on which is mounted a compound power-multiplying lever, said lever comprising a primary and a secondary member and being adapted to exert pressure in a plane intersecting the wire line, means for imparting reciprocatory motion to said carriage, means for actuating said lever during the feeding stroke of the carriage thereby maintaining pressure against the wire, and a clamp independent of said carriage for retaining the wire during the return stroke of the carriage in the position occupied by it at the end of the feeding stroke, and means to actuate said clamp.

11. In machines for feeding wire, a slidably mounted feed carriage, on which is mounted a compound power-multiplying lever positioned and adapted to exert pressure transversely of and through the wire line, means for imparting reciprocatory motion to said carriage and for actuating the said lever during the feeding stroke and for releasing it during the return stroke, said means comprising a lever pivotally mounted intermediate its ends so as to be adapted to oscillate both in the plane of movement of the carriage and transversely of said plane, means for actuating said lever, means for clamping the wire in fixed position during the return stroke of the carriage, and means for severing a blank from the wire during said return stroke.

12. In machines for feeding wire, a feed carriage mounted for reciprocatory motion, means adapted to clamp the wire to the carriage, said means comprising a compound power-multiplying lever mounted on said carriage, and consisting of a primary and a secondary member, the said secondary member being pivotally mounted to oscillate in a plane passing through the wire line, a lever one end of which is pivotally connected to the said primary member, said lever being pivotally mounted at a point intermediate its ends on a fulcrum independent of the carriage whereby it is adapted to be oscillated in a plane substantially parallel with the line of movement of the carriage and simultaneously in a plane containing the line of motion of its pivotal connection with said primary lever, a cam cooperating with said lever and formed to impart reciprocatory motion to said carriage and also to cause said lever to oscillate vertically thereby actuating it during the feeding stroke and releasing it during the return stroke, means independent of said lever for normally maintaining said compound lever in retracted position, means for clamping the wire in fixed position relative to the carriage during the return stroke, and means for severing a blank from the wire during the return stroke.

13. In machines for feeding wire, the combination of a feed carriage slidably mounted for horizontal motion, a feed lever, one end of which is pivotally and slidably connected with said carriage, a fulcrum for said lever intermediate its ends, means for adjusting the position of said fulcrum, means for adjusting the position of said lever with respect to said fulcrum and means for oscillating the said lever on said fulcrum.

14. In machines for feeding wire, the combination of a feed carriage slidably mounted for horizontal motion, a feed lever, one end of which is pivotally and slidably connected with said carriage, a fulcrum for said lever intermediate its ends, means for adjusting the position of said fulcrum, means for adjusting the position of said lever with respect to said fulcrum and a cam for oscillating said lever on said fulcrum.

15. In machines for feeding wire, a feed carriage, a feed lever, a fulcrum for said lever whereby the said lever is adapted to be oscillated in a substantially horizontal plane, means whereby said lever may be adjusted with respect to said fulcrum, means for adjusting the position of said fulcrum with respect to said carriage and means for imparting oscillatory motion to said lever.

16. In machines for feeding wire, the combination of a feed carriage, a feed lever, a fulcrum for said lever, said lever being longitudinally slidable thereon, means for adjusting the position of said fulcrum with respect to said lever and means for imparting oscillatory motion to said lever.

17. In machines for feeding wire, a pair of cooperating shearing quills, one of said quills being mounted on a carrier, means for actuating said carrier to move said last-mentioned quill alternately into and out of registry with the first-mentioned quill to cut off a blank, a push-rod in line with the said quill when the same is out of registry, and means for thrusting said push-rod into and out of said last-mentioned quill to eject a blank therefrom when said quills are out of registry with each other.

18. In machines for feeding wire, a pair of cooperating shearing tools, one of said tools being mounted on a carrier and adapted to support a blank when the same has been sheared off, means for actuating said carrier to move the last-mentioned tool alternately in and out of registry with the other of said tools to cut off a blank, a push-rod positioned to reciprocate in line with said last-mentioned tool when the same is out of registry and means for thrusting said push-rod in a direction to eject a blank from said last-mentioned tool when the latter is out of registry with the other of said tools.

19. In machines for feeding wire a mechanism for cutting off blanks consisting of two cooperating shearing members, one of said members being movable, means for actuating said movable member to shear off a blank and carry it out of alignment with a wire line, a push-rod adapted to be actuated in line with said movable member when the same is out of alignment with the wire line, means for thrusting said push-rod against the blank carried by said movable member and for ejecting the same therefrom when the said movable member is out of alignment with the said wire line and for withdrawing said push-rod when the said blank has been ejected.

20. In machines for feeding wire, a slidably mounted feed carriage, a compound wire clamping leverage system mounted thereon, a feed carriage lever, one arm of which is connected with said leverage system, means operating through the other arm of said lever for causing said carriage to reciprocate and for operating said compound leverage system during the feeding stroke thereof.

21. In machines for feeding wire, a slidably mounted feed carriage, a compound wire clamping leverage system mounted thereon, a feed carriage lever, one arm of which is connected with said leverage system, means operating through the other arm of said lever for causing said carriage to reciprocate and for operating said compound leverage system during the feeding stroke thereof, said means consisting of a cam.

22. In machines for feeding wire, a slidably mounted feed carriage, a feed carriage lever for causing said carriage to reciprocate, the said lever being provided with a movable fulcrum for varying the ratio of its arms, and also means for changing the position of said fulcrum without changing the ratio of the arms of said lever.

In testimony whereof, I have signed this specification.

ANDREW C. CAMPBELL.