In the production of many articles of manufacture, rectangular (or other polygonal) frames of wire are required which can be produced slowly and at considerable expense by handwork. My invention relates to a machine which is designed to form such articles automatically with a minimum of attention, and so produce them rapidly and on a large scale. One object of my invention relates to a construction and mode of operation in accordance with which the wire is fed automatically from a reel, severed into lengths of the proper length to form the particular articles being produced during momentary intervals of rest, and the severed lengths bent into shape while the next length is being fed and severed, so that the wire-feeding and bending of the articles proceed simultaneously; another object relates to the provision of self-contained bending units adjustable on the frame of the machine so that it may be arranged to bend the wire into frames of various sizes and shapes; and other objects relate to various novel details of construction and arrangement of cooperating parts and members adapting it to accomplish the work for which it is intended.

In the appended claims I have particularly pointed out the essential elements of my invention, it being understood, however, that my invention is susceptible of embodiment in various forms of construction differing considerably from that particularly shown in the accompanying drawings and described in the following specification, and that I do not limit my claims to the particular construction shown and described.

In Figure 1 of the accompanying drawings I have illustrated a machine embodying my invention in front elevation; Figs. 2 and 3 are vertical cross-sections in planes indicated by the section lines 2--2 and 3--3 of Fig. 1, showing in elevation opposite sides of one of the bending units; Fig. 4 is a rear view and Fig. 5 a front view of one of the units; Fig. 6 is a front view of the mechanism for disconnecting the upper feed roll, and of the shearing mechanism connected therewith; Fig. 7 is a side view of the same as viewed towards the left from the plane indicated by the section line 7--7 of Fig. 6; Fig. 8 is an elevation of parts at the upper left end of the machine, parts in front of the section line 8--8 being removed; Fig. 9 is a detail showing in side elevation the clamping member 55 for holding the wire on the anvil; Fig. 10 is a face view of the anvil; Fig. 11 is a vertical axial section of the bending head, the cooperating anvil being shown in elevation; and Fig. 12 is a view looking from rear to front, showing the adjusting key applied to the rack rod, other parts being omitted.

The same reference characters indicate the same parts on all the figures of the drawing.

The stationary frame work of the machine may be constructed of any suitable members secured together in suitable manner. In the present instance the frame includes leg castings 1 and 2, secured together by a top bed plate 3 and a lower frame bar 4. At its opposite end the bed plate carries brackets 5 and 6, formed with journal bearings near their tops in which is rotatably mounted the cam shaft 7 later to be described. The upper front side is machined to form a rail 8 upon which the base blocks 9 of the bending units may be slidably adjusted and secured.

Before proceeding to a detailed description of the machine it may be first briefly explained that the wire is drawn from a suitable source of supply, as a reel of wire, at what will be termed the left side of the machine (the left as viewed in Fig. 1) through a straightening device, by means of a pair of feed rollers which are arranged to be momentarily disengaged while the wire is cut at a point adjacent the left side of the machine; the severed length is then transferred forwardly by a series of plungers mounted in the bending units and deposited upon a series of anvils members which are also projected forwardly to receive the wire, the plungers being immediately retracted to permit a second length of wire to be fed in position for the next transfer movement, and while this feeding movement proceeds bending members carried by the outermost bending units (the first and fourth from the cutting mechanism) operate first to bend the ends of the wire downwardly, whereupon the anvils of such units are retracted and bending members on the second and third units then operate to make downward bends to form the completed rectangle, the anvils of the two inner units then being retracted to drop the formed frame upon inclined rods which direct it to a stack of formed frames.

Describing in order the mechanisms in-
volved in the foregoing operations, the straightening mechanism, which is supported by a bracket 10 at the left end of the machine, includes two series of straightening rollers, the two series, which are alike in construction, operating in planes arranged at right angles to each other and in the present instance in horizontal and vertical planes. In the present instance each series consists of seven rollers, four rollers, marked 11, on one side of the wire, and three rollers, marked 12, on the other side, the rollers of the two sets being arranged in staggered relation. One of the two sets of each series, in the present instance the set containing the three rollers 12, is mounted in a carrier frame 13 which through parallel links 14 pivoted on the supporting bracket may be swung as a unit away from and towards the set of rollers 11 and brought to dead center position. The four rollers 11 are also carried by a block 15 which is adjustable at its ends with respect to its stationary support, so that they may be adjusted as a unit with respect to the swinging set of rollers 12. All of the rollers are individually adjustable in the blocks which carry them, but it is obvious that when the rollers of each set are once aligned, it will but rarely be necessary to readjust them, whereas the sets may readily be separated for changing the wire, and the shifting of the block 15 provides for a nice adjustment of the set of rollers 11 to accommodate wires of different gauge or different degrees of ductility.

The wire, as it leaves the straightening devices, passes between the members of an automatic clutching device which permits its onward feed, but grips the wire automatically in case the elasticity of the wire causes the initiation of a retractive movement when the wire is released by the feed rollers preparatory to a cutting operation. This clutch consists of a roller 16, and a pivoted segment 17 having an eccentric face which contacts the wire and exerts a wedging action on it at the beginning of any backward pull. In the absence of this device objectionable variation in the length of severed wire lengths would occur upon changing from one reel of wire to another of different stiffness and elastic characteristics, but the employment of this clutching device has been found to prevent any noticeable variation.

The lower and larger grooved feed roller 18, keyed to a shaft 19 Journalled in the machine frame, has secured to one face a continuously driven gear wheel 10 which meshes with a gear 20 similarly secured to the side face of the upper and smaller feed roller 21. This upper feed roller is mounted in a spring-pressed rocking lever 22 which is intermittently pivoted on the left hand end bracket of the machine frame and which is intermittently rocked to lift the roller 21 out of engagement with the lower feed roller thus interrupting the feeding of the wire, although the gears remain in engagement and rotate the feed rollers idly.

The rocking feed roller lever 22 is operated by a shear feed lever 23 which extends transversely of the machine, that is, from front to rear as viewed in Fig. 1, and is equipped with a shearing blade 24. This lever 23 is arranged to first rock the feed roller lever, which is thereupon automatically latched in lower position, and then, while the wire is stationary, the blade 24 on such lever severs a length of wire to later be fed to form a frame, after which the sheer lever recedes, the latch holding the feed roll lever being disengaged to permit the feeding movement to be resumed, either immediately or after a regulated delay which enables a determined length of wire to be fed before the next cutting movement of the knife.

As shown in Figs. 6 and 7, the shear lever 23 is pivoted upon a bearing pin 23f fixed to the rear side of the end bracket 5 of the machine, and extends upwardly and forwardly to a point above the right end of the feed roller lever. At its forward end it carries a cam roller 26 arranged to engage the periphery of a rotary cam 27 keyed to the cam shaft 7 before mentioned. Intermediate its length the shear lever is equipped with a bearing roller 28 which, when the lever is depressed, immediately contacts with the right end of the feed roll lever and depresses it. The strand of wire to be severed is threaded through a block 25 carried by the bracket 5 and makes shearing contact with the blade 24, which is adjustably secured in an oblique seat formed on the underside of the shear lever, so that further depression of the shear lever after it has depressed the feed roll lever will sever the length of wire which has been fed through the block 25.

The feed roll lever is latched in lower position by means of a rocking spring-pressed catch lever 29 formed with a shoulder on its forward side arranged to latch over an adjustable block 30 seated in a recess in the top of the feed roll lever and having a portion projecting laterally from the rear side of such lever. The catch lever 29 is formed with a rock arm 29a equipped with a roller engaging a rotary cam 31 which is secured to the cam shaft 7 and is angularly adjustable with respect thereto, in order to vary the time of release of the latch, and thus vary the duration of the feeding movement and consequently the length of the strips which are fed and severed. In order to facilitate adjustment of the cam to produce a determined length of wire, the cam projection, marked 31a is provided with an index line arranged to cooperate with a calibrated scale on the face of the clamping plate 32, with reference to which it is adjustable, the scale indicating
in inches the length of wire which will be fed and severed under the indicated adjustment. This enables the machine to be set very quickly to produce the particular length desired.

It is to be understood that the upper feed roll stands higher when the machine is operating on wire of large diameter than when operating on small wire, and that, inasmuch as the lever 22 is strongly stressed by its spring, marked 22a, it is desired that such lever shall have a minimum drop upon being unlatched.

The operating face of the block 30 on the lever 22 is therefore made adjustable in height by forming the bottom of the block and its opposing seat with inclined wedge faces, and providing a screw adjustment for shifting the block to cause it to ride up or down upon the wedge face at the bottom of the seat. In this manner a nice adjustment of the unlatching movement is attained.

As the wire is fed onwardly to the right by the feed rolls beyond the plane of the cutting blade it passes between two guide rails extending longitudinally of the machine, the lower of which, marked 40, is in the present instance rectangular in form and formed with a flat upper face, and is secured to the bracket 6 at the right end of the machine frame. This guide rail is supported intermittently its length by the frames of the bending units hereinafter described, which are formed with slots forming seats arranged to slidingly receive and support each rail, and the left end of the rod is beded on its upper face to receive the wire as it is fed upon it. The upper guide rail 41, is fixed at its rear edge to a cylindrical rod 42 which is pivotally mounted at its right end in a socket in the end bracket 6, and at its left end abuts against the end bracket 5. The lower side of this upper guide rail, which is formed with a downwardly open groove to receive the wire, rests upon the upper face of the lower rail during the feeding movement of the wire, and through means hereafter to be described the upper rail is oscillated in a direction to lift its free edge, and the length of wire is transferred forwardly from the top of the lower rail to the anvils of the bending mechanism next to be described.

The bending mechanism, with which is associated the mechanism for transferring the cut lengths of wire to the bending members, in the present instance consists of four units, A, B, C, and D, slidingly adjustable longitudinally of the machine, which are similar in construction, except that in the present instance (and preferably) they are constructed as two "rights" and two "lefts," and excepting also that one or more of the units, in the present instance the unit C only—the third unit from the left—is equipped with a clamping mechanism for holding the cut length of wire against longitudinal movement.

Describing this unit C, which is illustrated in detail in Figs. 2 and 3, the frame of the unit includes a base block 43 slidingly adjustable upon the rail 8 above mentioned and cut away to clear and slidingly support the lower guide rail 40 before mentioned; a frame plate 44 secured to such block and orificed to accommodate the upper guide rail 41 and slidingly receive and support its pivot rod 42; and also to slidingly receive a rack bar 46 which extends between the end brackets 5 and 6 of the machine and through which adjustment of the position of the bending units is accomplished.

First describing the transfer mechanism, the several lengths of wire successively deposited by the action of the feed rolls on top of the rail 40 and within the groove of the rocking rail 41 are in turn each shifted by the simultaneous action of the plungers 47 in the bending units.

Each plunger 47 is slidingly mounted in a groove formed in the lower face of the frame plate 44, the path of the plunger lying just below the pivot rod 42 before mentioned and the plunger being arranged to cam upward the upper guide rail as it moves forwardly so as to lift the forward edge of such guide rail and permit the wire to clear the forward wall of the groove therein as it is pushed forwardly.

To effectively eject the wire from the groove, during this movement I employ an ejector consisting of an ejector bar 45 within the groove connected by a series of spaced pins 49 to an upper bar 50 disposed above the rocking guide rail 41, a set of compression springs 51 being used to normally hold the connected ejector parts in upper position. When the rail 41 is cammed upward by the plunger 47, the upper bar 50 of the ejector device contacts a portion of the frame plate above it, producing relative movement between the rail 41 and ejector bar 45, which latter holds the wire down upon the lower guide rail as the upper guide rail rises to clear the wire.

After the rail has been lifted the forward movement of the plungers 47 transfers the wire to the anvils 52, the upper faces of which lie in the same plane as the upper faces of the rails 40, the anvils being mounted on the forward end of slides 33 which are shifted in lines parallel to the movements of the plungers, and are arranged to be projected forwardly into working position slightly in advance of the final movement of the plungers and wires.

The anvil slide 33 of each unit is mounted in a rectangular groove formed in the upper face of the base block 43 of the bender unit, immediately below the groove in which the
plunger 47 is mounted, so that the plunger in fact slides upon the anvil slide beneath it. The top of the anvil slide is cut away adjacent the lower guide rail 40 to permit the requisite movement of the slide and anvil without interference.

The bending member which bends the wire on the face of the anvil consists of an oscillating disc-shaped head 52, rotatably mounted in a bearing block 44 bolted to the frame plate 44, at its forward side. In the present instance the oscillating head is formed with a forwardly extending hub forming a pivot portion 55 engaging the bearing in the block 44, and a squared front end portion 50 equipped with a crank arm 50 by means of which the head is oscillated. To the rear side of the head 52 is secured a hardened steel forming tool 55 seated in a recess in such head, the tool having a rearwardly extending portion 55 overhanging the anvil when it is projected and the wire thereon, such overhanging portion being formed with a plane working face which as the head is oscillated moves from a horizontal position parallel with the wire and upper face of the anvil to a vertical position, or a position slightly past the vertical in case the wire is somewhat elastic and does not retain a permanent set in the position to which it is forced by the tool, to make the bend.

To secure the forming tool to the head, the tool is formed along one edge with a beveled face, and is clamped into its seat by means of a clamping bolt 56 and a clamping block 57 having an overhanging beveled face arranged to cooperate with the beveled face of the forming tool.

It will be observed that the overhanging portion 55 of the forming tool extends only from about the vertical center line of the bending tool, and the head of the plunger or transfer bar 47 is out of alignment with such projecting portion and in the present instance is formed with a right-angled portion extending laterally along the path of the wire in the opposite direction from the projecting or overhanging active portion of the tool to afford an extended engaging face. This extended head of the plunger is provided on its upper face with a series of grooves to permit spaced engagement through the grooves of the teeth of a vertically-reciprocable spring-pressed sliding detent 95 which is cammed upwardly by the wire as it is driven forwardly by the plunger 47 to the bending seat between the top of the anvil and the overhanging portion 55 of the forming tool, the detent then springing downwardly behind the wire. For purposes of adjustment this detent is mounted in a block which by an adjusting screw 96 may be raised or lowered to accommodate it to different sizes of wire.

The transfer mechanism, anvils and bending heads of the machine are timed and caused to operate in synchronism by means of rotary cams 61 which are formed with hollow hubs 61a journaled in bearings at the top of the frame plate 44. The axial bore of the hubs makes splined engagement with the cam shaft 70 before mentioned, so that the cams may all be operated in any position of adjustment longitudinally of the bed of the machine. As illustrated each cam is formed with a side groove 62, and two peripheral cam faces 63 and 64. The side groove 62 controls the movement of the bending head, through a cam roller engaging said groove and mounted intermediate the ends of a rocking lever 65 which at its rear end is pivoted to a bearing hub on the frame plate 44 and at its front end is connected by a turnbuckle link 66 with the crank arm 50 before mentioned.

The peripheral cam face 63 controls the movements of the anvil slide 52 and anvil 55 through a cam roller mounted on the forwardly extending arm 67 of a bell-crank lever which is pivoted in a bearing at the rear side of the frame plate 44, the other arm 56 of such lever being pivoted to the rear end of said slide. The cam roller is held up to the face of the cam by means of a compression spring 58 seated in a recess in the frame plate below the slide 52 and interposed between a fixed end plate and a pin 59 depending from such slide.

The peripheral cam face 64 controls the movement of the plunger 47 of the transfer mechanism through a roller mounted on the forwardly extending arm 58 of a bell-crank lever having a depending arm 70 formed with a slotted lower end engaging a laterally projecting stud secured to the depending member of a right-angled block 71 recessed to receive the end of the plunger 47 and secured thereto. As before mentioned, in order to prevent any longitudinal slippage of the length of wire which otherwise might occur during the bending operation I have provided a clamping mechanism which is carried by one of the bending units, in the present instance the unit C being so equipped. This mechanism consists of a rocking clamping member 72 having its rear end arranged to clamp the wire down upon the face of the anvil 52 and its front end connected by a link 73 with the forward end of a rocking lever 74 which is intermittently pivoted on the frame plate 44 and is stressed by a spring 75 in a direction to produce the clamping action mentioned, the rear end of the lever being intermittently shifted against the tension of the spring to effect release of the wire by means of the action of the inner face of a ring cut in the left face of the cam member 61 upon a roller carried by the end of said lever. The shape of the cam is such as to initiate clamping pressure immediately after the wire strip has been deposited upon the anvils and to
release the wire after the final bends have been made.

Adjustment of the bending units to points on the bed for making the bends of a particular frame is effected by loosening the clamping nuts securing the units to the bed, and inserting a pinion key—see Fig. 12—having its outer end formed with gear teeth, in a socket in the frame plate of the unit so that the gear will engage the rack rod before mentioned, whereas the turning of the key will react upon the unit to slide it upon the rail of the bed plate of the machine to the position desired, after which it may be again clamped tightly to the rail.

It will be understood that since the two bends simultaneously formed by the outer units A and D are made in opposite directions, as are likewise the bends made by the units B and C, the crank arms, (which oscillate through arcs of substantially less than 180°), are oppositely inclined in each of the pairs mentioned. The contour and setting of the cams is such that the four transfer members and anvil slides shift to forward position at nearly the same time, the anvils completing their movement slightly in advance of the transfer members, and the transfer plungers are immediately retracted, while the anvils of units A and D are later retracted simultaneously at the end of the bending operations effected by said units A and D, and the anvil slides of units B and C are retracted at the end of the bending operation of such units, thus completing the cycle of operations occurring in one revolution of the cam shaft.

The machine above particularly described is adapted to form rectangular frames such as the one illustrated in Fig. 1 (marked x), but it is obvious that any desired number of bending units may be employed to form frames of any particular number of sides, the outer bends of the wire strip being first bent, then the adjacent bends, and so on until the final bend is made by the innermost pair of units, or single unit if the number of bends required is an odd number, the anvils and arcs of oscillation of the bending head and tool of the unit being of course changed to form the particular shape of article desired.

The operating connections which I have employed in the particular machine described to carry out the required movements of the parts include a pulley 80 at the rear side of the machine fixed to the motor shaft of a motor 81 and engaged by a belt 82 which also engages a second pulley 83 secured to a shaft 84 rotatably mounted in the bed plate of the machine. A pinion 85, also fixed to this shaft, is geared to a gear wheel 86 secured to the shaft 15° before mentioned, which shaft extends across the machine and at its front end carries the gear 19 of the lower feed roll, thus driving the feed rolls when they are connected together.

Power is communicated through the shaft 15° to the cam shaft 7 by means of a bevel gear 88 on said shaft 15°, an intermeshing bevel gear 89 secured to a short vertical shaft 90 journaled in bearings carried by the end plate 5, a pinion 91 also secured to said shaft 90 and formed with spirally cut gear teeth, and a gear wheel 92, formed with spirally cut teeth meshing with said pinion 91 and secured to said cam shaft 7. Other and different trains of connections for bringing about the same movements may of course be employed if desired.

It is of course obvious that my invention is applicable to the bending of square, or flat wire, or strips of metal of any desired cross section, such changes in the shape and size of the parts being made as are necessary in the particular case.

I claim:

1. In a wire working machine, a pair of intermittently disengaged feed rollers arranged to draw a strand of wire longitudinally from a source of supply; a series of straightening rollers engaging said strand between the source of supply and said feed rollers, and an automatic clutch adjacent said feed rollers arranged to prevent retraction of said strand when said feed rollers are disengaged, said automatic clutch consisting of a roller and a diametrically opposite pivot member formed with an arcuate face eccentric to the pivotal axis of such member.

2. In a wire working machine, a stationary lower guide rail extending longitudinally of the machine and forming a wire support, a moveable upper guide rail formed with a wire-receiving channel on its under side arranged to normally contact said lower rail, means for feeding a strand of wire into said channel, means for successively severing lengths of wire fed into said channel, means for intermittently lifting said upper rail, and transfer means arranged to successively shift the severed lengths transversely.

3. In a wire working machine, a stationary lower guide rail extending longitudinally of the machine and forming a wire support, a moveable upper guide rail formed with a wire-receiving channel on its under side arranged to normally contact said lower rail, ejection means in said channel arranged to cooperate with a stationary part of the machine when said upper guide rail is lifted, means for feeding a strand of wire into said channel, means for successively severing lengths of wire fed into said channel, means for intermittently lifting said upper rail, and transfer means arranged to successively shift the severed lengths transversely.

4. In a wire working machine, a stationary
lower guide rail extending longitudinally of the machine and forming a wire support, a moveable upper guide rail formed with a wire-receiving channel on its under side arranged to normally contact said lower rail, means for feeding a strand of wire into said channel, means for successively severing lengths of wire fed into said channel, intermittently moveable transfer members extending transversely of the machine and arranged to automatically lift said upper guide rail and successively shift the severed lengths of wire transversely.

5. In a wire working machine, a stationary lower guide rail extending longitudinally of the machine and forming a wire support, an upper guide rail pivoted at one edge and having on its under side a wire-receiving channel, means for feeding a strand of wire into said channel, means for successively severing lengths of wire fed into said channel, and sliding plunger members extending transversely of the machine, said members being arranged to cam the free edge of said upper guide rail upwardly and transfer the severed length of wire laterally.

6. In a wire bending machine, wire-feeding means arranged to feed a length of wire longitudinally, wire-supporting means arranged to receive and support such length, an anvil forming a second wire support intermittently moveable transversely of the machine to a work station at one side of said wire-supporting means, transfer means for shifting said length from said wire-supporting means to said anvil, and an intermittently-moveable bending member arranged to cooperate with said anvil at said work station to form a bend in the length of wire, said anvil being retracted from said work station to release the bent length after the formation of the bend.

7. In a wire-bending machine, wire-feeding mechanism arranged to feed a length of wire longitudinally, wire-supporting means arranged to receive and support such length, a pair of anvils together forming a second wire support, said anvils being simultaneously moveable transversely of the machine to a work station at one side of said wire-supporting means, transfer means for shifting said lengths of wire from said work-supporting means to said anvils, and a pair of moveable bending members arranged to simultaneously cooperate with said anvils at said work station to form bends in such length, said anvils being simultaneously retracted from said work station to release the bent length after the formation of the bends.

8. In a wire bending machine, wire-feeding mechanism arranged to feed a length of wire longitudinally, wire-supporting means arranged to receive and support such length, a plurality of more than two anvils arranged in line and together forming a second wire support, said anvils being simultaneously movable transversely of the machine to a work station at one side of said wire-supporting means, transfer means for shifting said lengths of wire from said work-supporting means to said anvils, and a plurality of moveable bending members arranged to respectively cooperate with said anvils at said work station to form bends in such length, the two end bends being first formed and the anvils concerned then retracted and the adjacent bends being next formed and the anvils retracted until all bends have been formed and all anvils retracted to finally release the bent length.

9. In a wire bending machine, wire-feeding means arranged to feed a length of wire longitudinally, wire-supporting means arranged to receive and support such length, an anvil forming a second wire support intermittently moveable transversely of the machine to a working station at one side of said wire supporting means, transfer means for shifting said length from said wire-supporting means to said anvil, intermittently-moveable clamping means for holding said length down on said anvil, and an intermittently-moveable bending member arranged to cooperate with said anvil at said work station to form a bend in the length of wire, said clamping means being released and said anvil retracted from said work station to release the bent length after the formation of the bend.

10. In a wire-working machine, feeding mechanism including a stationary mounted feed roll, a rocking feed roller, a moveable feed roll pivotally mounted on said lever and arranged to be rocked thereby into and out of cooperative engagement with said first mentioned roll, a transversely arranged rocking shear lever operatively connected with said feed roll lever to disengage said moveable roll, said shear lever being equipped with a blade arranged upon further movement of such lever to sever the wire.

11. In a wire-working machine, feeding mechanism including a stationary mounted feed roll, a rocking feed roll lever, a moveable feed roll pivotally mounted on said lever and arranged to be rocked thereby into and out of cooperative engagement with said first mentioned roll, means for latching said feed roll lever in disengaging position, a transversely arranged rocking shear lever operatively connected with said feed roll lever and arranged to be automatically rocked to initially rock said feed roll lever to disengage said moveable roll, said shear lever being equipped with a blade arranged upon further movement of such lever to sever the wire, and means for releasing said latching means.

12. In a wire working machine, feeding mechanism according to claim 11 in which said latch-releasing means is adjustable to time the release of the latch.

13. In a wire working machine, feeding
mechanism according to claim 11 in which the latched engagement between the latch and the feed roll lever is adjustable to govern the extent of return movement of the lever.

14. In a wire-working machine, feeding mechanism including a stationarily mounted feed roll, a rocking feed roll lever, a movable feed roll pivotally mounted on said lever and arranged when rocked to shift into and out of engagement with said first mentioned roll, a latch for automatically latching said feed roll lever when such lever is shifted to disengaging position, a transversely arranged rocking shear lever operatively connected with said feed roll lever and arranged when rocked to initially rock said feed roll lever to disengage said movable roll, said shear lever being equipped with a blade arranged upon further movement of such lever to sever the wire releasing said latch, a rotary cam controlling said shear lever, and a second rotary cam controlling said latch releasing means, one of said cams being angularly adjustable.

15. A wire bending machine having a supporting rail and wire-feeding means and wire-supporting means parallel with said supporting rail arranged to receive and support a length of wire and a driven shaft journaled in the machine frame parallel with said supporting rail and a plurality of longitudinally adjustable bending units mounted on said rail; each of said units including a frame and a transversely-movable anvil, and a transversely movable transfer member, and a vibrating bending member operatively connected with said shaft in all positions of the units.

16. A wire bending machine according to claim 15 in which each bending unit includes a disk splined to said driven shaft and operatively connected to said anvil and transfer member and bending member.

17. A wire bending machine according to claim 15 in which each bending unit includes a cam member splined to said driven shaft and formed with three cam faces arranged to severally control the movements of the anvil and transfer member and bending member.

18. A wire bending machine according to claim 15 in which at least one of said bending units includes a clamping mechanism arranged to clamp the length of wire upon the anvil.

19. A wire bending machine according to claim 15 in which each bending unit includes a cam member splined to said driven shaft and formed with three cam faces arranged to severally control the movements of the anvil and transfer member and bending member, and in which at least one of said bending units includes a clamping member arranged to clamp said length of wire in said anvil, said cam member being provided with a fourth cam face arranged to control the movement of said clamping member.

20. In a wire bending machine, a bending unit including a frame, an anvil slidingly mounted in said frame and when in operative position arranged to support the wire, automatic means for positioning a length of wire on said anvil, an oscillating bending member rotatably mounted in said frame, and means for operating said anvil and said bending member in timed relation and in synchronism with said automatic wire positioning means to successively support the wire, form a bend, and release the bent wire.

21. In a wire bending machine having longitudinally extending wire supporting means and means for feeding a length of wire onto said supporting means, a bending unit including a frame, an anvil slidingly mounted in said frame and when in operative position arranged to support the wire, a transfer member slidingly mounted in said frame and arranged to shift the wire laterally onto said anvil, an oscillating bending member rotatably mounted in said frame, and means for operating said anvil and transfer member and bending member in timed relation.

22. A wire bending machine having a longitudinally extending supporting rail and wire feeding means and a lower guide rail and an upper movable guide rail, said guide rails being arranged to receive and support a length of wire, and a plurality of bending units adjustable mounted on said supporting rail; each of said units having a frame cut-away in the path of the lower guide rail, and an anvil on said support, and, a transversely disposed transfer member intersecting the path of the upper guide rail, said transfer member being arranged when operated to displace said upper guide rail, and a vibrating bending member, and operating connections on said unit for operating said anvil and transfer member and bending member.

In testimony whereof, I have subscribed my name.

EDWIN V. SWANGREN.