WIRE CUTTING AND BENDING MACHINE

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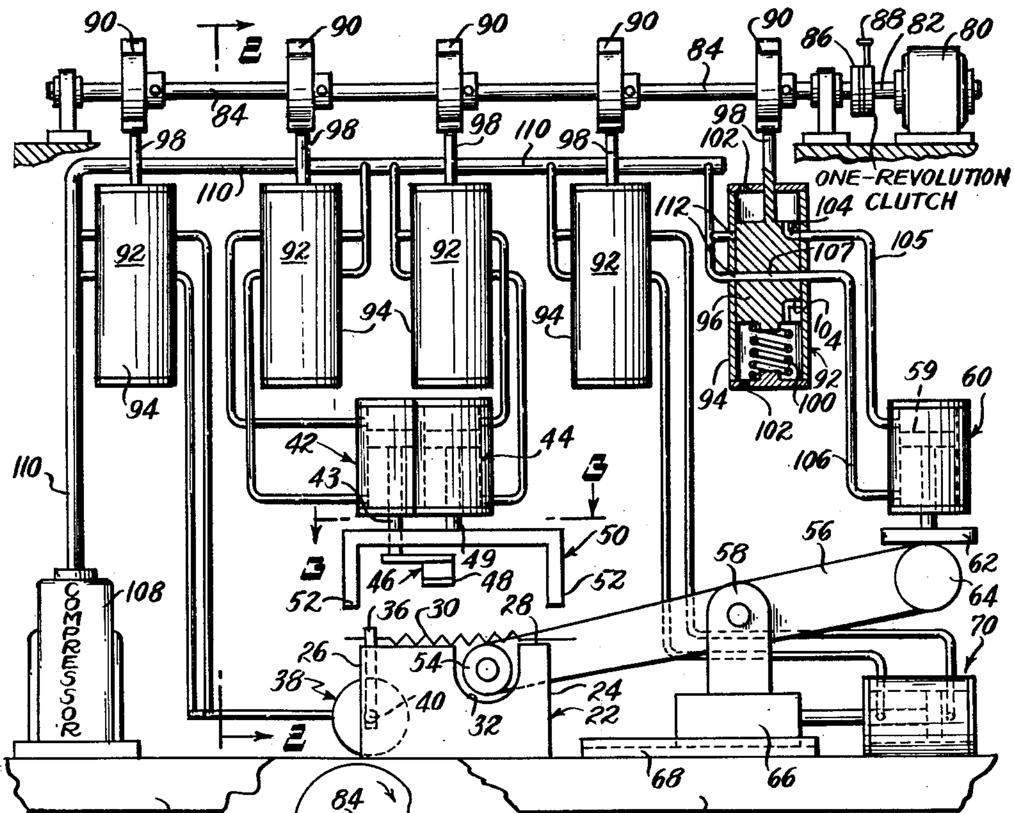

Fig. 1.

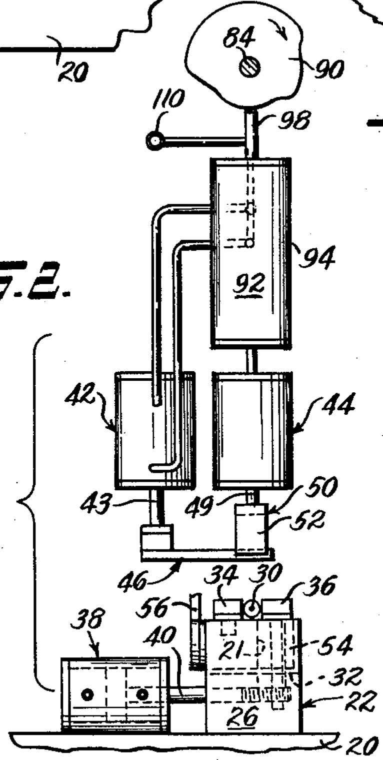

Fig. 2.

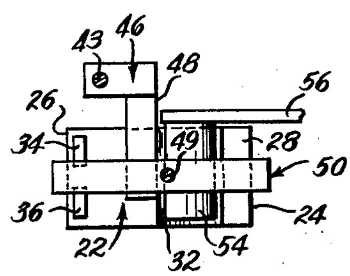

Fig. 3.

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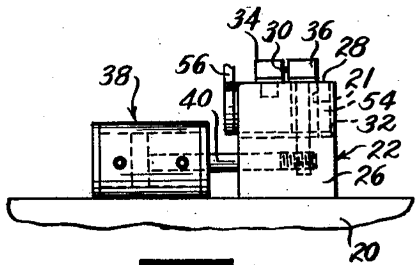


Fig. 4.

Fig. 5.

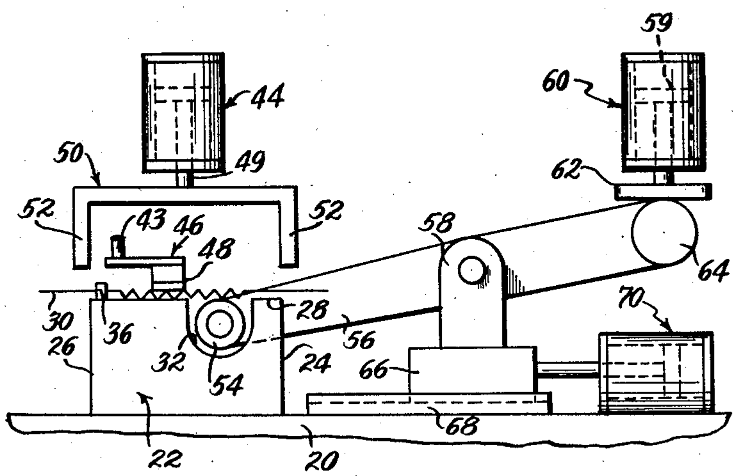
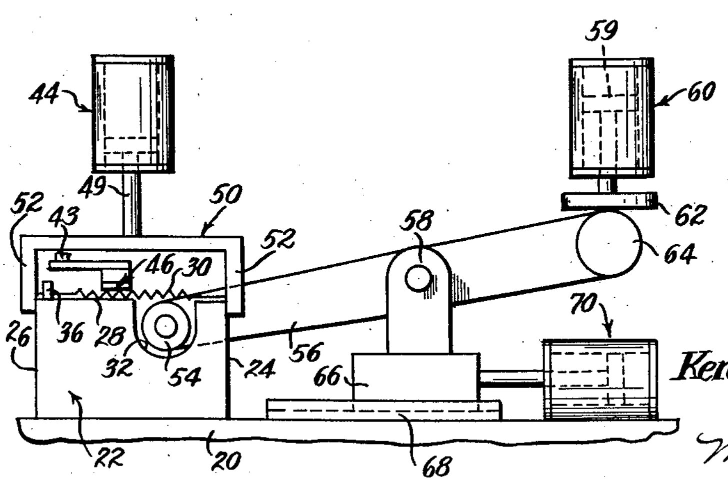


Fig. 6.



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WIRE CUTTING AND BENDING MACHINE

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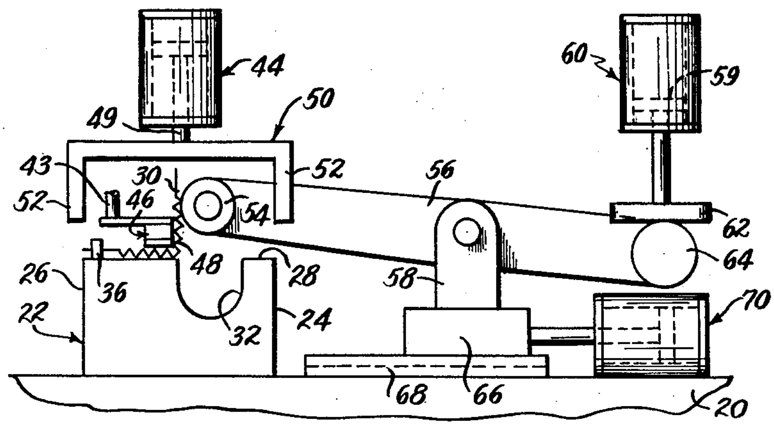

Fig. 7.

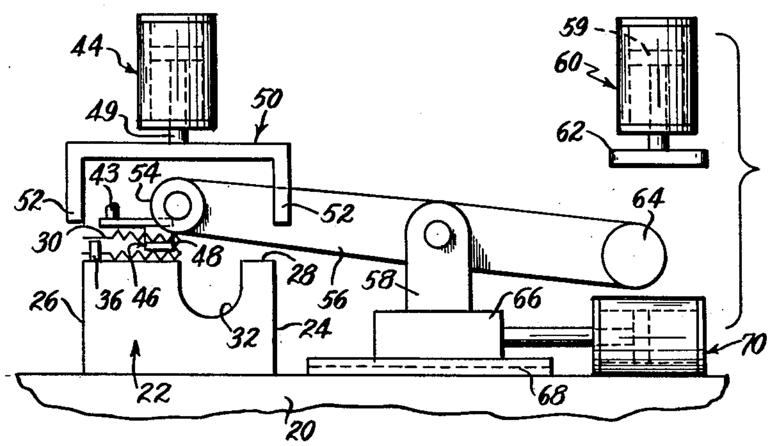

Fig. 8.

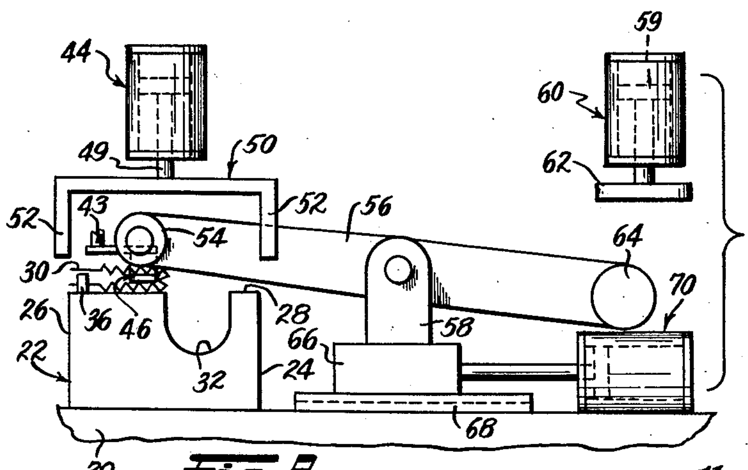

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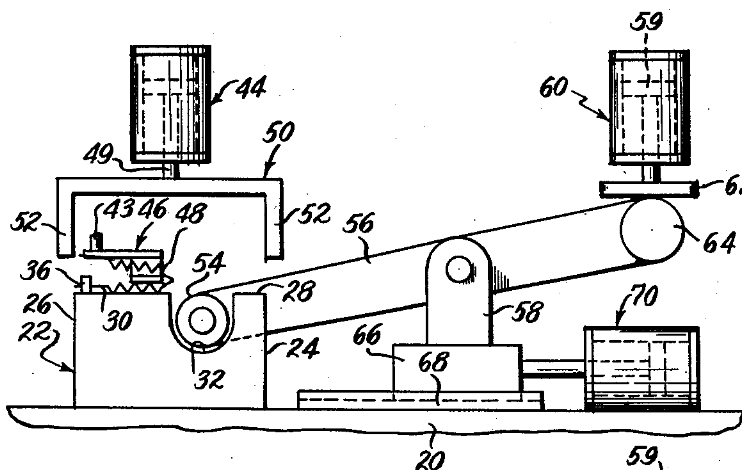
Fig. 10.



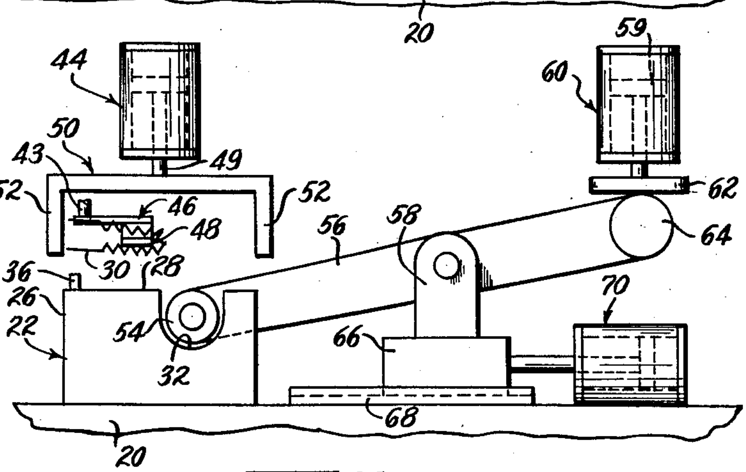


Fig. 11.

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WIRE CUTTING AND BENDING MACHINE

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Application August 18, 1958, Serial No. 755,649

5 Claims. (Cl. 153—16)

This invention relates to a wire cutting and bending machine.

The object of the invention is to provide a simple machine which shall cut a wire to predetermined length and then fold the wire midway of its length into V form.

A form of machine for carrying out the invention is exemplified in the accompanying drawings in which:

Fig. 1 is a front view of the machine with the drive mechanisms for the various parts shown more or less diagrammatically and exemplified as fluid operated servo motors.

Fig. 2 is a section on the line 2—2 of Fig. 1.

Fig. 3 is a section on the line 3—3 of Fig. 1.

Fig. 4 is a detail of wire clamping mechanism.

Fig. 5 is a front view of a wire cutting and bending mechanism after a bending mandrel has been brought to operative position.

Fig. 6 is a similar view showing the position of parts after the wire cutter has been rendered operative.

Fig. 7 shows a preliminary bending operation on the wire, after the cutter has been raised.

Fig. 8 shows an intermediate stage in the position of parts during the bending of the wire.

Fig. 9 shows the final position assumed by parts when the wire has been bent.

Fig. 10 shows a restored position of the bending mechanism and

Fig. 11 shows the final position of parts, with the mandrel raised and carrying the bent wire in position for easy removal thereof from the machine.

Referring to the drawings in greater detail, at **20** there is indicated the table of a machine on which is suitably supported the wire cutting and bending mechanism.

Mounted on the table is a rectangular block **22** having vertical cutting side walls **24** and **26** and an upper surface **28** on which a wire **30** to be cut and folded may be laid by an operator.

In the upper surface near the side wall **24** and parallel to it is a recess **32**, spanned by the wire **30**. The wire is laid in place between a pair of posts **34** and **36** in a position such that it spans the recess and has its ends extending over the side walls. The post **34** is a rectangular prism fixed in the upper surface while the post **36** may be slidably shiftable in a slot **21** in the block **22** laterally toward and from stop **34** to clamp a wire. In order to move the post **36**, there is provided a fluid pressure operated servo motor **38** controlled as will be described, whose piston rod **40** is threaded into the lower end of post **36**.

Suitably fastened to a standard (not shown) mounted on the table **20** and above the block **22** is a pair of servo motors **42** and **44**. The piston rod **43** of the motor **42** carries a horizontal plate or mandrel **46** in a position to be brought down close to the wire **30** and with one edge **48** in line with one edge of the recess **32** as shown in Figs. 5 and 6. The stroke of the piston is made such or the cylinder is adjusted to a height such that

the mandrel in its down position will not crush the wire but will merely contact the same. The piston rod **49** of the second motor **44** carries a U-shaped cutter blade **50** whose legs **52** cooperate with the end walls **24** and **26** to cut the wire laid across the top of the block. The sequence of operation of parts thus far described is that when a wire has been laid on the block **22** between the posts **34** and **36**, the post **36** is operated to clamp the wire (Fig. 4), then the mandrel is brought down close to the wire (Fig. 5) and the cutter operated to cut off the ends (Fig. 6).

Normally resting, by gravity, in the recess **32** in the block is a roller **54**. The roller is supported by an arm of a lever **56** pivoted in a cleft at the top of a shiftable pivot stud **58** and operated by the piston **59** of a servo motor **60** supported from the table whose piston rod has a flat plate **62** engageable with a roller **64** at the end of the lever. The pivot stud is fixed on a slide block **66** slidable in a pair of parallel ways **68** fixedly mounted on the table **20**. The slide block is operated by a servo motor **70**. It has already been described how the wire clamp, mandrel and cutter act. After the wire has been cut, as shown in Fig. 6, the cutter, but not the mandrel, is lifted to the position shown in Fig. 7. Substantially simultaneously with the lifting of the cutter **50**, the motor **60** is energized to depress the plate **62** which thereupon engages the roller **64** to tilt the lever **56** to the position shown in Fig. 7. The roller **54** at the left hand end of the lever thereupon rides up out of the recess **32** and bends the wire **30** at substantially a right angle about the edge of the mandrel **46**. Fluid pressure is then applied to the servo motor **70** which then initiates lateral movement of the roller **54**. At the same time fluid pressure is applied to the motor **60**. When the roller **54** reaches the position shown in Fig. 8, the piston in cylinder **60** is raised to its full position. Thereafter the piston in motor **70** continues its stroke until it reaches the left hand of the cylinder and the roller **54** has completed its travel over the wire to the position shown in Fig. 9.

Continuing with the operation of parts, next fluid pressure is admitted to the left hand side of motor **70** to allow the roller **54** to drop into the recess **32**, as shown in Fig. 10 and then the motor **38** is operated to release the clamp jaw. Finally fluid pressure is admitted beneath the piston in motor **42** to raise the mandrel **46** to the position shown in Fig. 11. When the wire is released from pressure of the roller **54** due to the retracting action of the motor **70**, it will, due to its resiliency, spring to V form and when the mandrel is in its up position, the wire may be readily stripped off by an operator from its support, and parts are in position whereby another wire to be cut and folded may be placed on the block **22**.

While many forms of drive and controls for the different parts may be provided, there is here shown a continuously operating electric motor **80** supported by the table whose shaft **82** is driven at a desired speed, the shaft **82** being coupled to a cam shaft **84** mounted on the side of the table by a conventional one-revolution clutch **86** having a control start button **88**.

The cam shaft has fastened thereto cams **90** of suitable configuration to operate valves **92** in the sequence to obtain the required sequence of operation of clamp, mandrel, cutter and bending roller previously described. The valves may be of any suitable character and are here shown as being slide valves each having a casing **94** fixedly mounted on the table and a slide valve **96** therein. The slide valves are urged in one direction by a slide valve rod **98** fixed to the slide valve and engaging a cam and in an opposite direction by a spring **100** of sufficient force to overcome the pressure of the fluid above the piston, when the surface of the cam **90** withdraws from the rod **98**, the spring reacting between the piston and one end of the cylinder. The cylinder is vented at each end as indicated at **102**, and the piston has a pair of passages **104** each communicating with a side of the piston and with its respective end of the piston via conduits **105** and **106**. When the piston moves to its up or down position, a correlated end of a servo motor, for example, motor **60**, is vented, as can be seen in the drawing. A cross bore **107** midway between the side ports of passages **104** connects with the unvented end of the motor to allow fluid pressure to enter the motor. Fluid pressure flows from a compressor **108** and manifold **110** to each of the valves via ports **112** in alignment with the bore **107** when the slide valve is at either of its two extreme positions.

Having thus described the invention, what is claimed is:

1. A wire bending machine comprising a base, a block mounted on said base and adapted to support a wire, a recess in said block, a mandrel above said block movable toward and from said block with one edge of the mandrel close to an edge of the recess, a lever pivoted on the base having a free end lying in said recess and below the wire, means pivoting the lever so as to bring the free end out of the recess to preliminarily bend the wire to an L-shape about the mandrel, and means shifting the pivot of said lever in a direction transverse to the recess and in a direction toward the mandrel to complete the bending of the wire into U-shape about the mandrel.

2. A wire bending machine comprising a base, a block mounted on said base having opposed cutting edges and adapted to support a wire extending across and beyond said cutting edges, a pair of cutter blades reciprocatable toward and from said block and cooperative with said edges to cut off the overlapping ends of said block, a recess in said block, a mandrel above said block movable toward and from said block with one edge of the mandrel close to an edge of the recess, a lever pivoted on the base having a free end lying in said recess and below the wire, means pivoting the lever so as to bring the free end out of the recess to preliminarily bend the wire to an L-shape about the mandrel, and means shifting the pivot of said lever in a direction transverse to the recess and to complete the bending of the wire into U-shape about the mandrel.

3. A wire bending machine comprising a base, a block mounted on said base and adapted to support a wire and having upstanding spaced lugs to accommodate said wire, a recess in said block, a mandrel above said block movable toward and from said block with one edge of the mandrel close to an edge of the recess, a lever pivoted on the base having a free end lying in said recess and below the wire, means pivoting the lever so as to bring the free end out of the recess to preliminarily bend the wire to an L-shape about the mandrel, and means shifting the pivot of said lever in a direction transverse to the recess and to complete the bending of the wire into U-shape about the mandrel.

4. A wire bending machine comprising a base, a block mounted on said base and adapted to support a wire and having upstanding spaced lugs to accommodate a wire therebetween, means to relatively move the lugs toward each other to clamp the wire, a recess in said block, a mandrel above said block movable toward and from said block with one edge of the mandrel close to an edge of the recess, a lever pivoted on the base having a free end lying in said recess and below the wire, means pivoting the lever so as to bring the free end out of the recess to preliminarily bend the wire to an L-shape about the mandrel, and means shifting the pivot of said lever in a direction transverse to the recess and to complete the bending of the wire into U-shape about the mandrel.

5. A wire bending machine comprising a base, a block mounted on said base and adapted to support a wire, a recess in said block, a mandrel above said block movable toward and from said block with one edge of the mandrel close to an edge of the recess, a lever pivoted on the base having a roller on its free end lying in said recess and below the wire, means pivoting the lever so as to bring the roller free end out of the recess to preliminarily bend the wire to an L-shape about the mandrel, and means shifting the pivot of said lever in a direction transverse to the recess and to complete the bending of the wire into U-shape about the mandrel.

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