(No Model.)

2 Sheets—Sheet 1.

C. M. SUTER.

WIRE BENDING MACHINE.

No. 508,257. Patented Nov. 7, 1893.

Fig. 1.

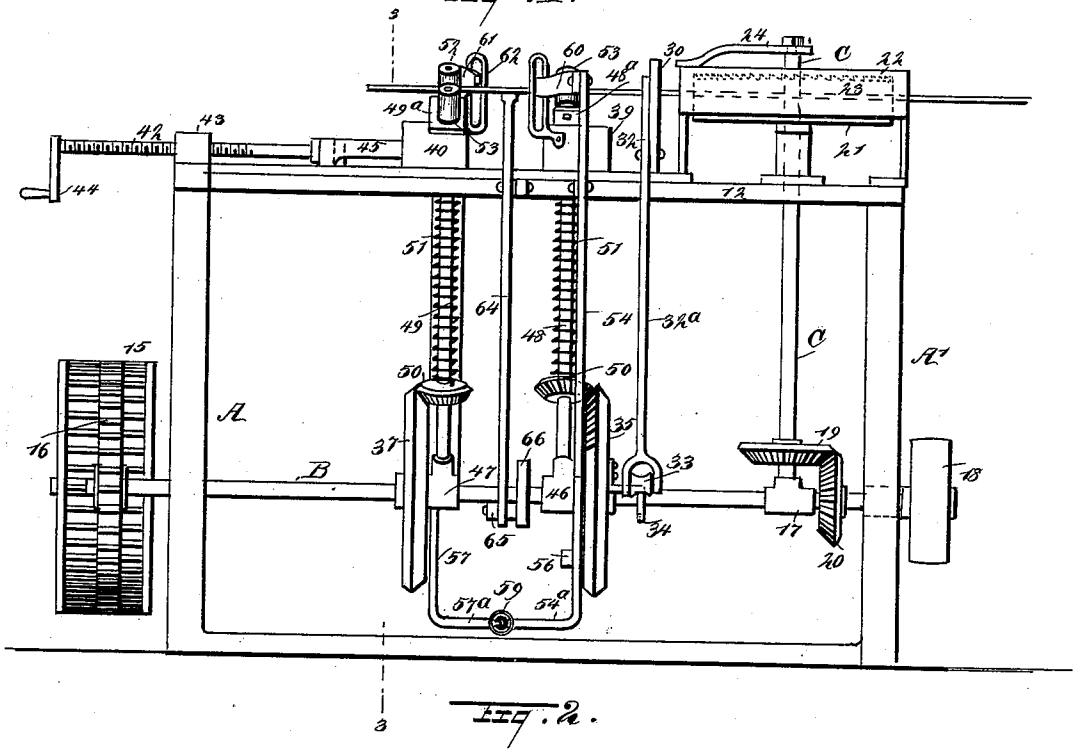


Fig. 2.

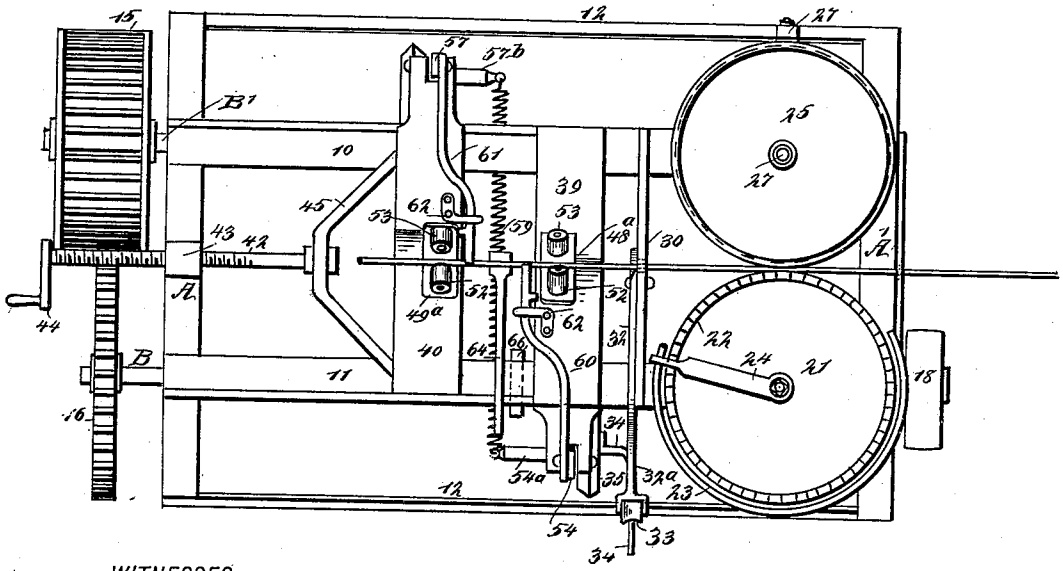
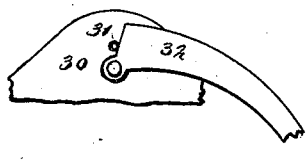


Fig. 8.



WITNESSES:

H. Walker

C. Sedgwick

INVENTOR

C. M. Suter

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THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

(No Model.)

2 Sheets—Sheet 2.

C. M. SUTER.

WIRE BENDING MACHINE.

No. 508,257. Patented Nov. 7, 1893.

Fig. 3.

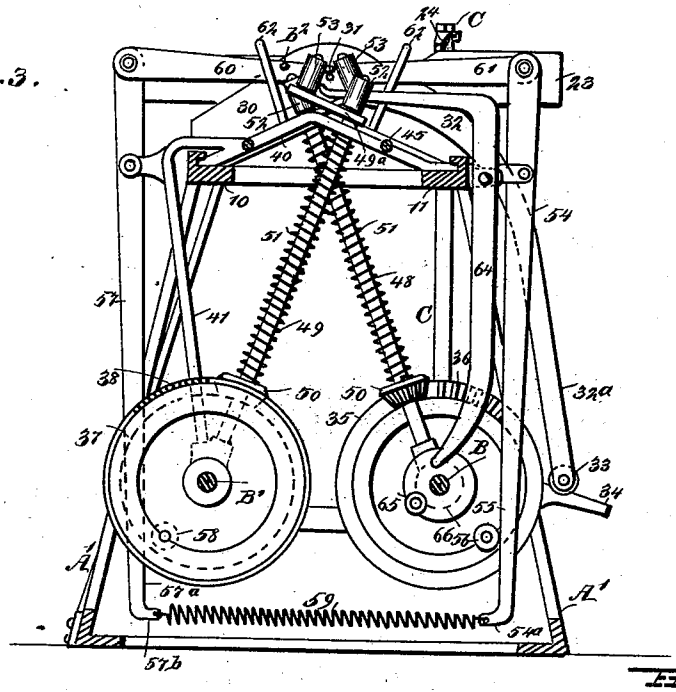


Fig. 4.

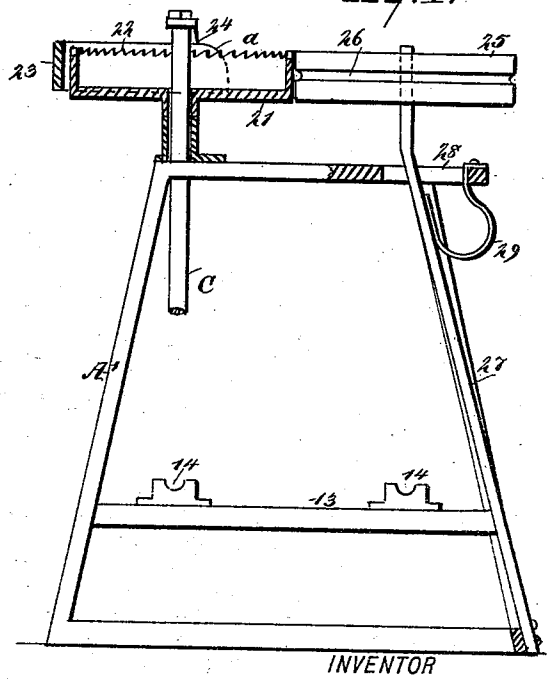


Fig. 5.

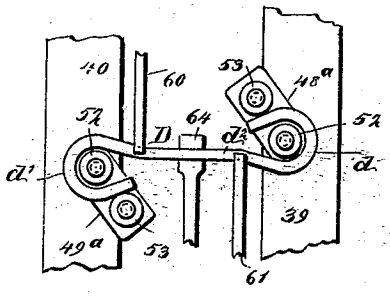
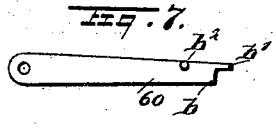


Fig. 6.

Fig. 7.



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UNITED STATES PATENT OFFICE.

CYRUS M. SUTER, OF ASHTON, ILLINOIS.

WIRE-BENDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 508,257, dated November 7, 1893.

Application filed April 8, 1893. Serial No. 469,593. (No model.)

To all whom it may concern:

Be it known that I, CYRUS M. SUTER, of Ashton, in the county of Lee and State of Illinois, have invented a new and Improved Fence-Staying Machine, of which the following is a full, clear, and exact description.

My invention relates to a machine for making stays especially adapted for placing the strands of wire fences and holding them a predetermined distance apart.

Another feature of the invention consists in constructing the machine in such manner that the operation of forming a stay will be automatic throughout, the stays being made successively from a length or coil of wire.

The invention consists in the novel construction and combination of the several parts, as will be hereinafter fully set forth and pointed out in the claims.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar figures and letters of reference indicate corresponding parts in all the views.

Figure 1 is a side elevation of the machine. Fig. 2 is a plan view thereof. Fig. 3 is a vertical transverse section, taken practically on the line 3—3 of Fig. 1. Fig. 4 is a detail view partially in section and partially in side elevation of the wire guide and straightening device. Fig. 5 is a plan view of the twisting mechanism, illustrating its operation. Fig. 6 is a detail perspective view of a completed stay. Fig. 7 is a detail view of one of the kinking and holding arms; and Fig. 8 is a detail view, illustrating the location of the cutter.

The frame of the machine comprises two end standards A and A'; the said standards are narrower at their tops than at their bottoms. The standards support at their upper ends two slideways 10 and 11, which extend from end to end of the machine, and the standards are connected near their lower ends longitudinally by side rails 12, and each standard is provided near its lower end with a cross bar 13. Each of the cross bars is provided with two bearings 14 of any suitable or approved construction, the bearings being adapted to serve as journals for two driving shafts B and B' and said shafts are parallel. The shaft B turns in its bearings only, while the shaft B' not only turns in its bearings but has end movement also. The shaft having end movement is provided at its outer end with a gear 15, the said gear being made with a very wide face in order that a second gear 16 may be in constant mesh with it no matter to what extent the shaft B' is shifted endwise, the second gear 16, being secured upon the shaft B.

An upright shaft C, is held to turn in a bearing 17, secured upon the shaft B near the end opposite that carrying the gear 16 and near the end of the shaft carrying the driving pulley 18, as shown in Fig. 1. The shaft C is rotated from the shaft B by means of two beveled gears 19 and 20, one of the gears being secured upon the shaft B while the other is attached to the shaft C, as is likewise shown in Fig. 1. The shaft C, is adapted to operate and feed a straightening device, which device is located upon the top of the frame and is shown best in Fig. 4. The said device consists of a flanged disk 21, which disk is mounted to turn around the upper end of the shaft C, its flange being provided with teeth 22. Around the flange of the disk a guard 23, is supported, the edge of the guard extending above the toothed surface of the flange of the disk. The guard does not extend entirely around the flanged disk, but nearly so, terminating, however, at each side of its inner face, and the ends of the guard are curved, as shown best in Fig. 4, at *a*.

A spring dog 24, is attached to the upper end of the shaft C, so that the dog may have vertical movement; and the said dog is adapted at times to engage with the teeth of the flanged disk and at other times to travel along the upper edge of the guard 23. The flanged disk is located at one side of the longitudinal center of the machine, and at the opposite side of its center a second disk 25, is located, the latter disk being provided with a peripheral groove 26, and the grooved surface of the disk 25, is adapted for constant engagement with the outer face of the flange of the disk 21. The grooved disk 25, is secured upon the upper end of a spring arm 27, which passes upward through a slot 28 in the frame, as likewise shown in Fig. 4, and the two disks are held in constant engagement by a spring 29, attached to the frame and exerting in-

ward pressure upon the supporting arm of the disk 25. As long as the dog 24, is in engagement with the teeth 22 of the feed disk 21 this disk will be revolved, and likewise the opposing disk 25, by frictional contact, and the wire, which may be taken from a reel, and is passed between the groove of the disk 25 and the opposing face of the disk 21, will be fed toward the center of the machine and straightened while being fed; but the moment that the shaft has revolved a sufficient distance to cause the dog to enter upon the guard 23, the feed disk will instantly stop revolving.

A vertical partition 30, is secured upon the upper portion of the frame, extending from the slideway 10 to the slideway 11, and this partition is provided with an aperture 31, produced in it, which aperture is immediately opposite the space between the two feed disks, and the wire after passing between the said feed disks is passed toward the center of the machine through the aperture 31, and at the time the feed disks cease operating, or shortly after such operation, the wire is cut at the inner face of the partition, and this is accomplished through the medium of a knife 32, which knife is preferably pivoted upon the partition, its cutting edge being adapted to travel across the aperture 31. The shank of the knife curves outward and downward from its cutting surface over the slide way 11; and in the lower end of the shank of the knife, which shank may be designated as 32^a, a roller 33, is preferably located, and this roller is acted upon by an arm 34, shown in both Figs. 2 and 3, which arm extends from the peripheral surface of a wheel 35, securely mounted upon the drive shaft B.

The wheel 35, is plain with the exception of a portion of its periphery which is provided with a series of teeth 36 of predetermined number, and a second wheel 37, similar to the wheel 35, is located upon the driven line shaft B′, the wheel 37, being out of alignment with the wheel 35, and preferably farther from the transverse central portion of the frame, as shown in Fig. 1. The wheels 35 and 37, are preferably beveled and the teeth upon the wheel 37, are designated as 38.

An upwardly arched cross bar 39 is secured upon the upper portion of the frame transversely thereof, adjacent to the partition 30, to which the wire is fed; and a second and like cross bar 40, is mounted upon the top of the frame, parallel with the cross bar 39; the cross bar 40, is not fixed upon the frame, but, as shown in Fig. 3, is adapted to slide in the slide-ways 10 and 11; and the sliding cross bar at one of its ends is connected with the driven line shaft B′, through the medium of an arm 41, as shown likewise in Fig. 3. The driven line shaft B′, is laterally adjusted by the adjustment of the sliding cross bar 40, and the latter is moved laterally upon the frame through the medium of an adjusting screw 42, which screw is passed through an apertured bearing, the walls of the aperture being threaded,—and the said bearing, designated in the drawings as 43, is located upon the central portion of the end of the frame at which the driving gears 15 and 16, are located. The screw is preferably turned through the medium of a crank arm 44, but other devices may be employed, and the connection between the screw and the sliding cross bar is effected through the medium of a strap or yoke 45, as shown best in Fig. 2.

Adjacent to each of the partially toothed wheels 35 and 37, bearings are loosely mounted upon the drive shaft B and driven shaft B′, the said bearings being designated in the drawings as 46 and 47 and best shown in Fig. 1. The bearing 46, is adapted to receive the lower end of a twisting shaft 48, while the bearing 47, receives the lower portion of a similar shaft 49. These shafts extend upward, one through an opening in the central portion of the fixed cross bar 39, and the other through an opening similarly located in the sliding cross bar 40. Thus the shafts are somewhat diagonally positioned, and their upper ends are practically on a line with the central portion of the machine. Each shaft is provided with a pinion 50, and the pinions travel in engagement with the partially toothed wheels 35 and 37, as shown in Figs. 1 and 2. Each shaft has coiled around it a spring 51, the lower ends of said springs being preferably secured to the pinions and the upper ends to the cross bars through which the shafts pass. Thus it will be observed that the shafts 48 and 49, will remain passive while their pinions are in engagement with the smooth surfaces of the wheels 35 and 37, but the shafts will be revolved the moment that the pinions engage with the teeth of said wheels, and as soon as the pinions have passed the toothed portions of the wheels, the springs 51, will act to restore the shafts to their former positions. These shafts may be termed twisting shafts, as they are intended, and do, twist loops or eyes in the wire to be operated upon, and to that end, each shaft is provided with an upper cross bar or head, designated respectively as 48^a and 49^a, and shown best in Fig. 5. Immediately over each shaft a vertical friction roller 52, is located upon the cross heads of the shafts, while a like roller 53, is located at the outer end of each cross head, the two rollers being in alignment in each case, as is likewise shown in Fig. 5. These rollers may be properly termed twisting rollers.

The stay D, to be formed is shown in both Figs. 5 and 6, and comprises a stretch of wire of predetermined length having an eye or loop d at one end and a second loop or eye d' at the opposite end, the said eyes or loops being formed at different sides of the body portion d^2, and the said body portion is adapted to be straight or practically so. Thus while the loops are being formed in a piece of wire by the rollers on the cross heads 48^a and 49^a, it is necessary that the central portion of the

wire, or that portion between the loops, should be maintained straight; and it is further desirable that the body of the wire adjacent to the loops should be kinked somewhat in the direction of the open ends of the loops. To accomplish this, two levers are employed; one lever 54, is pivoted upon one end of the stationary cross bar 39, and this lever extends vertically downward adjacent to the outer face of the drive shaft B, and the lower end of this lever, which is below the drive shaft, is provided with a foot 54^a. Opposite the shaft the lever 54 is provided with a cam surface 55, shown best in Fig. 3, and this cam surface is adapted to be engaged by a friction roller 56, (or a pin or like device) located upon the partially toothed wheel 35 at or near the periphery thereof and somewhat adjacent to the arm 34 of said wheel. The second lever of like formation and designated as 57, is fulcrumed upon an extension from the sliding cross bar 40, as shown in Fig. 3. The lever 57, extends downward outside of the driven shaft B′, and is provided with a cam surface 57^a near its lower end, to be acted upon by the friction roller 58, or its equivalent, carried by the partially toothed wheel 37. The lever 57, is likewise provided with a foot 57^b, and the feet of the two levers, which are arranged parallel to each other, are connected by a spring 59, the spring being adapted to draw the lower ends of the levers in the direction of one another. Each lever is provided with an arm pivoted upon its upper end, and the said arms are designated respectively as 60 and 61. The arms, one of which is shown in detail in Fig. 7, pass over the top of the frame to a point centrally between the twisting cross heads 48^a and 49^a, and the said arms are out of transverse alignment, as shown in Fig. 2. The arms at their inner ends pass through loops 62, projected upward from the cross bars 39 and 40, said loops being adapted to limit the upward movement of the arms. Each arm at its inner end is provided with a recess in its lower edge, forming thereby a shoulder *b*, and a horizontal finger *b′* above the shoulder; and adjacent to the inner end of each arm a pin or projection b^2, is located, which pin or projection by engaging with a wall of the loop in which the arm has movement, will prevent the arm from being withdrawn from the loop. These arms are adapted to engage with the body of the wire, or that portion between the loops, as shown in Fig. 5, the arms engaging with opposite sides of the body, one near each loop; therefore they may be termed stay arms, although during the process of forming the stays they compress the body of the wire in such manner as to slightly kink it near the loops, as is likewise shown in Fig. 5. After the stay has been formed it is automatically discharged from the machine, and this is accomplished through the medium of a kicker arm 64, adapted to engage with the central portion of the body of the stay at the under surface thereof, as is likewise shown in Fig. 5. The kicker arm extends over the top of the frame of the machine, and is pivoted upon the slideway 11. The kicker arm is angular or L-shaped in general contour, as shown in Fig. 3, and one of its members extends vertically downward over the drive shaft B, and the kicker is operated by a friction roller or pin 65 coming in engagement with its lower end, which pin or friction roller is located upon a wheel 66, mounted upon the drive shaft, likewise shown in Fig. 3.

It will be observed that as the driven shaft B′ can be shifted endwise and that simultaneously with the shifting of the shaft, one of the stay arms and likewise one of the twisting shafts are shifted in the same direction as the driven shaft, stays of any length can be manufactured upon the machine.

I desire it to be distinctly understood that instead of the twisting shafts being revolved, the outer friction roller 53, carried by each shaft may be revolved and the shaft remain stationary, any desired mechanism being used to accomplish the time revolution of the said friction roller.

In the operation of the machine the wire is fed in between the feed disks, and as long as the dog 24 of the feed shaft C turns the said disks, the wire will be carried over the top of the machine and between the friction rollers on the two cross heads of the twisting shafts. When a sufficient length of wire for the construction of a stay has been fed to the said cross heads, the dog will enter upon the guard 23 of the feed device and cease operating the latter. At or near that time the arm 34 of the partially toothed wheel 35, will engage with the lower end of the cutter shank 32, and force the cutting edge of the cutter in contact with the wire, severing it at the front of the partition 30. At the time that this cutting operation has been accomplished, the teeth on the wheels 35 and 37, will have engaged with the pinions on the two twisting shafts, causing the wire to be twisted at its ends in oppositely disposed loops, as shown in Fig. 5; but simultaneously with the rotation of the twisting shafts the friction rollers 56 and 58 upon the said wheels 35 and 37, will have engaged with the cam faces of the levers 54 and 57, operating the stay arms 60 and 61, and the shoulders *b* of said arms will be brought to an engagement with opposite sides of the wire at each side of its center, as shown in Fig. 5, thereby holding this portion of the wire straight while the end portions are being twisted; and just at the time that the loops *d* and *d′*, are made in the stays, the levers will be acted upon to such an extent that extra inward pressure will be exerted upon the stay arms, sufficient to kink the body of the wire slightly in the direction of the upper ends of the loops. Thus a perfect stay is formed from a stretch or coil of wire of any desired length; and at the moment that the

loops are formed in the wire the pinions of the twisting shafts will have disengaged from the teeth upon the wheels 35 and 37, and the springs 51 on the shafts will thereupon act to turn the shafts in a contrary direction and restore their cross heads to their normal position; that is, in position to receive another length of wire, and at this time the kicker will be acted upon by the friction roller 65 of the wheel 66, which will press its lower end inward and throw its upper end upward and outward, which action of the upper end of the kicker will force the stay from the machine.

The operation of a machine of this pattern is automatic throughout, each part being timed to act in a proper manner, and at the same time the machine is simple, durable and economic in its construction.

It will be understood that if found desirable in practice, the rollers on the twisting shaft may be omitted and pins used in their stead.

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

1. In a machine for bending wire, the combination with a shaft and a dog carried by the shaft and capable of movement in one direction, of a feed device comprising a toothed disk loosely mounted upon the shaft and provided with teeth to be engaged by the dog, a guard partially surrounding the toothed portion of the disk or extending above it and adapted likewise for engagement with the dog, and a second disk held in frictional contact with the toothed disk, substantially as shown and described, whereby the wire will be fed by the disks while the dog is in engagement with the teeth of one of the disks only, substantially as and for the purpose specified.

2. In a wire bending machine, the combination, with a shaft and a dog mounted upon the shaft and capable of moving in one direction, yet moving with the shaft, of a feed device, the same consisting of a toothed disk loosely mounted upon the shaft, the teeth being adapted for engagement by the dog, a guard partially surrounding the toothed disk, likewise adapted for engagement with the dog, and a second disk held in yielding contact with the toothed disk, the second disk being provided with a peripheral groove, as and for the purpose specified.

3. In a machine for bending wire, the combination, with a shaft, a dog mounted thereon capable of movement upon the shaft in one direction, and a feed device, the same consisting of a toothed disk loosely mounted upon the shaft, a guard partially surrounding the toothed portion of the disk and extending beyond the teeth, and a second disk held in yielding contact with the toothed disk, of a plate located adjacent to the disks and having an opening for the passage of wire, a knife the cutting edge of which is adjacent to the said opening, a drive shaft connected with the feed shaft, and a driving mechanism carried by said shaft, adapted for time engagement with the knife to operate the same, as and for the purpose specified.

4. In a machine for bending wire, the combination, with drive shafts and wheels secured thereon, said wheels having a partially plain and a partially toothed surface, of twisting shafts provided with gearing adapted for engagement with the toothed surface of the said wheels, and cross heads carried by the said shafts, the said cross heads being provided with rollers arranged at predetermined intervals apart, the cross heads of the shafts being practically opposite each other, as and for the purpose set forth.

5. In a machine for bending wire, the combination, with driving shafts and wheels mounted thereon, which wheels are partially plain and partially toothed, of spring-controlled twisting shafts provided with gearing engaging with the wheels upon the driving shafts, the said shafts being practically in alignment at their upper ends, cross heads carried by the twisting shafts, and rollers located upon the cross heads, one over each shaft and the others near the end of each cross head, as and for the purpose set forth.

6. In a machine for bending wire, the combination, with driving shafts, of twisting shafts operated from the driving shafts, which shafts at one of their ends are practically in alignment, and opposing rollers connected with the upper ends of the shafts, one of the rollers of each shaft being adapted to travel around the other, as and for the purpose set forth.

7. In a machine for bending wire, the combination, with drive shafts, twisting shafts actuated from the drive shafts and provided with cross heads, each cross head containing two rollers and the cross heads being essentially oppositely arranged, of a feed device having time movement and located adjacent to the cross heads, a knife likewise having time movement and operating after the feed mechanism, and a driving connection between the drive shafts and the twisting shafts, actuated after the movement of the knife, as and for the purpose specified.

8. In a device for bending wire, the combination, with drive shafts, and spring-controlled twisting shafts driven by a time connection with the drive shafts, each twisting shaft being provided with a cross head and each cross head with twisting roller pins, of levers, a time mechanism operating the levers from the drive shafts, and straight arms connected with the levers, which arms extend between the cross heads, one near each cross head, the arms being provided with gripping surfaces at their inner ends, as and for the purpose set forth.

9. In a machine for bending wire, the combination, with drive shafts, twisting shafts having time connection with the drive shafts, and twisting roller pins carried by the said

twisting shafts, of levers having time connection with the drive shafts, stay arms carried by the levers and extending between the twisting roller pins of the twisting shafts, the arms being provided with gripping surfaces at their inner ends, one arm being located adjacent to the twisting pins of each shaft, and a kicker arm carried between the inner ends of the stay arms, the kicker arm having time connection with one of the drive shafts, as and for the purpose set forth.

10. In a machine for bending wire, the combination, with drive shafts, one of which is adjustable endwise, twisting shafts having time connection one with each of the drive shafts, and twisting roller pins carried by the twisting shafts, the roller pins being practically in alignment, of stay arms, the inner ends of which are located between the twisting or roller pins, one arm being located adjacent to the pins of each twisting shaft and the arms being provided with gripping surfaces at their inner ends, a time connection between each drive shaft and a stay arm, a shifting mechanism connected with one stay arm and with one of the twisting shafts, changing the distance between the twisting shafts, a kicker arm located between the stay arms and having time connection with one of the drive shafts, a feed mechanism located near one of the twisting shafts, and a knife intervening between said twisting shaft and the feed mechanism, the knife having a time connection with one of the drive shafts and being actuated therefrom, as and for the purpose set forth.

CYRUS M. SUTER.

Witnesses:
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H. E. CHADWICK.