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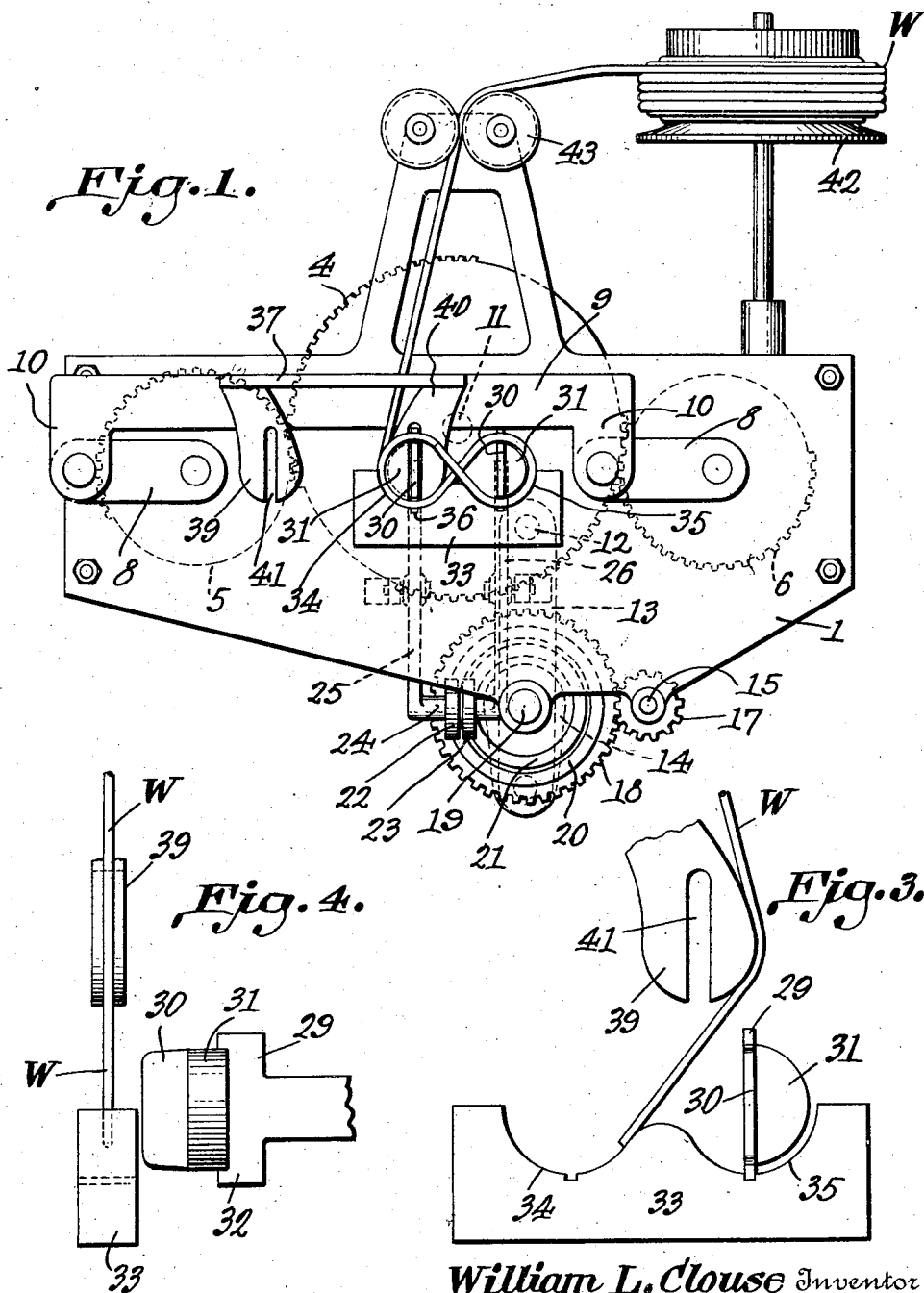
W. L. CLOUSE

1,639,397

WIRE BENDING MACHINE

Filed Nov. 13, 1926

3 Sheets-Sheet 1



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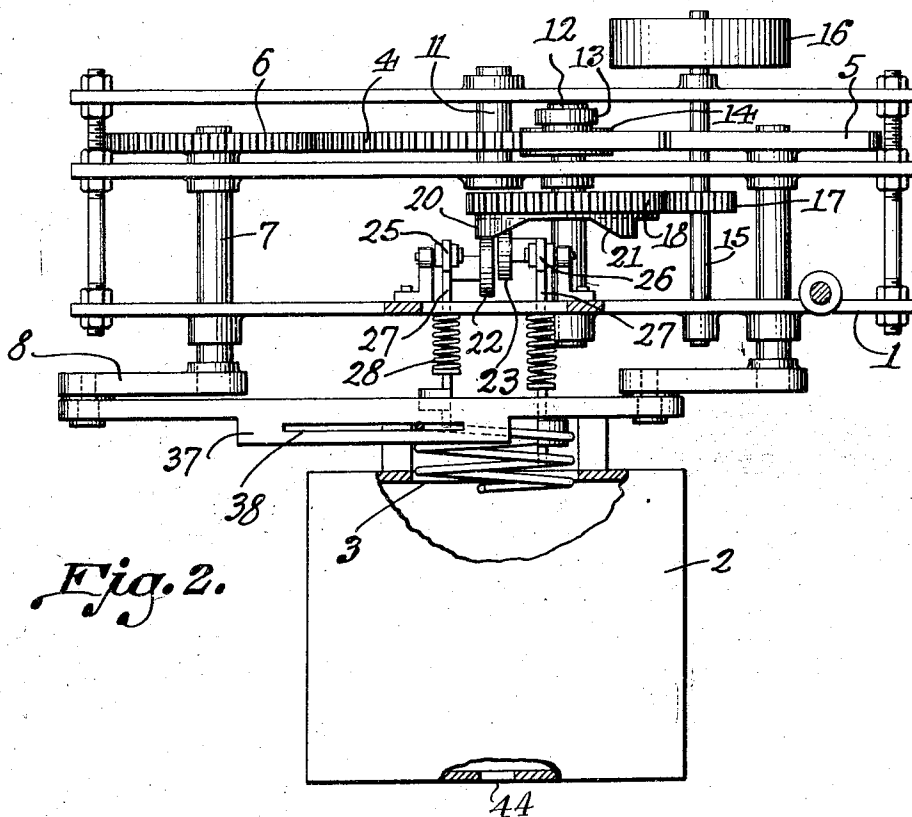
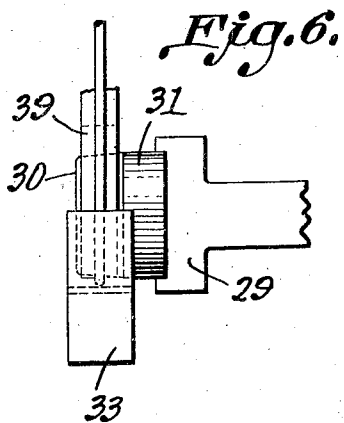
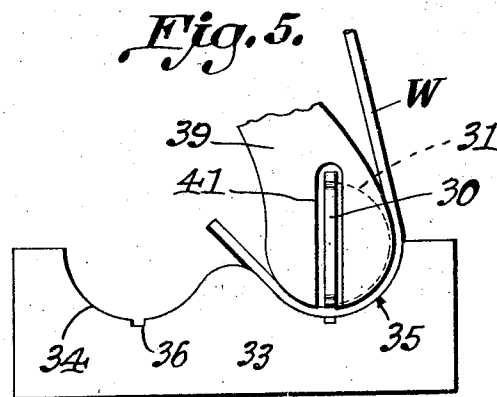
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3 Sheets-Sheet 2



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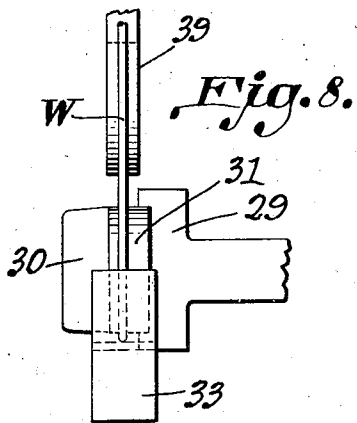
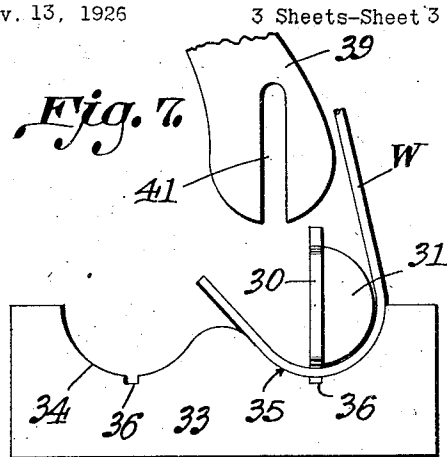
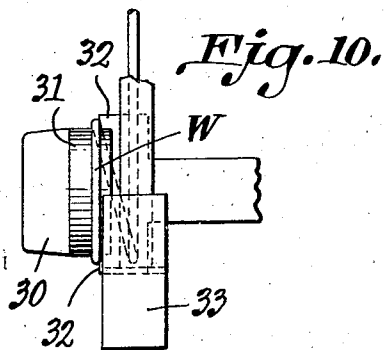
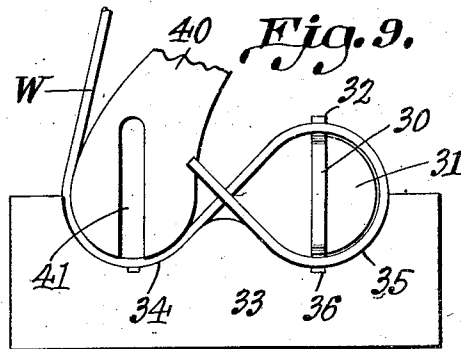
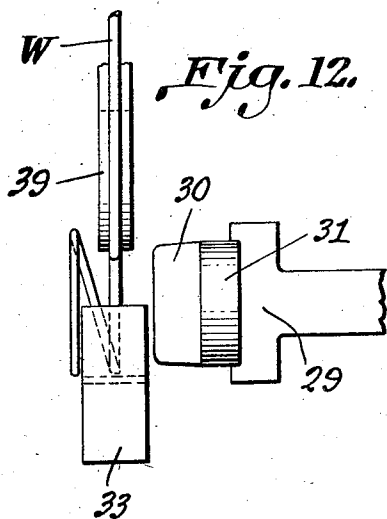
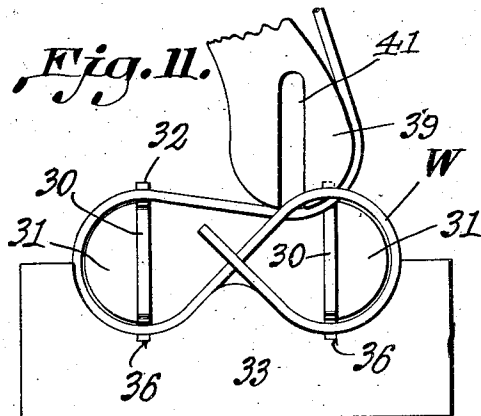
1,639,397

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WIRE BENDING MACHINE

Filed Nov. 13, 1926

3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE.

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WIRE-BENDING MACHINE.

Application filed November 13, 1926. Serial No. 148,292.

This invention relates to a machine designed for bending wire into the form of a figure 8. Heretofore, preparatory to feeding wire to a hot heading machine or the like, it has been the practice to direct the wire through a heating furnace. As a general rule the wire has been formed in a circular coil. It has been found, however, that by forming the wire into a coil shaped like a figure 8, a larger amount of wire can be introduced into the heating furnace at one time and thereby reduce the time required to heat the wire.

It is an object of the present to provide mechanism by means of which a length of wire can be readily bent into a figure 8 coil.

A further object is to provide a mechanism of this character no part of which need extend into the furnace, the mechanism operating to feed the advancing end of the coil into the furnace.

With the foregoing and other objects in view which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention herein disclosed may be made within the scope of what is claimed, without departing from the spirit of the invention.

In the accompanying drawings the preferred form of the invention has been shown.

In said drawings,

Figure 1 is an elevation of the machine.

Figure 2 is a plan view thereof, the stock supporting reel and the stock guides being removed and part of the furnace being shown.

Figure 3 is an elevation of the bending elements of the machine illustrating, more or less in diagram, the first step of the bending method.

Figure 4 is a side elevation of the parts illustrated in Figure 3.

Figure 5 is a view similar to Figure 3 showing the second step in the bending method.

Figure 6 is a side elevation of the structure positioned as in Figure 5.

Figure 7 is a view similar to Figure 5 showing the third step of the bending method.

Figure 8 is a side elevation of the parts positioned as in Figure 7.

Figure 9 is a view similar to Figure 7 showing the fourth step of the bending method.

Figure 10 is a side elevation of the parts positioned as in Figure 9.

Figure 11 is a view similar to Figure 9 showing the fifth step of the bending method.

Figure 12 is a side elevation of the parts positioned as in Figure 11.

Referring to the figures by characters of reference 1 designates the frame of the machine adapted to be set up outside of but close to a heating furnace indicated generally at 2 and which furnace has a coil receiving opening 3. Journaled in the structure 1 is a mutilated gear 4 having opposed series of peripheral teeth adapted successively to engage and intermittently rotate mutilated gears 5 and 6 secured to shafts 7 adjacent the respective sides of the structure 1. Each of these shafts has a crank arm 8 extending from one end thereof and pivotally connected to and supported by these crank arms is a cross bar 9 having depending ears 10 to which the crank arms 8 are attached. The two crank arms 8 are in the same positions to their respective gears and, therefore, as the gears are rotated simultaneously back and forth through 180° the bar 9 will be maintained horizontal as it is moved toward one side of the machine and then toward the other side successively. Any suitable means may be employed for rotating the gears 5 and 6 back and forth. For example, and as shown in Figure 2, the gear 4 may be provided with a wrist pin 12 connected by a pitman 13 to a crank 14 rotatable with a shaft 19. This shaft has a gear 18 driven by a gear 17 carried by the main drive shaft 15. Thus during the continuous rotation of shaft 15 a back and forth rotation of shaft 11 and gear 4 will be set up and produce a corresponding rotation of the gears 5 and 6, the parts being so proportioned that these gears 5 and 6 will be rotated through 180° or less, as required. Drive shaft 15 has a gear 17 meshing with a gear 18 secured to a shaft 19. Mounted on one face of the gear 18 are concentric cams 20 and 21 and cooperating with the respective cams are rollers 22 and 23 mounted on fingers 24 extending toward each other from the lower ends of levers 25 and 26 respectively. To

the upper ends of these levers are connected rods 27 guided for sliding movement within the structure 1 and having springs 26 mounted thereon and thrusting against structure 1 and also against the rods so as to hold the rollers 22 and 23 pressed yieldingly against the respective cams. At the forward end of each rod or plunger 27 is a flat substantially vertical head 29 having a forwardly extending wing 30. Extending laterally from one side of the head 29 and its wing 30 is a semi-cylindrical core 31, the greatest diameter of which is equal to the width of the wing 30. Opposed portions of the head 29 extend slightly beyond the core as shown at 32. The two heads 29 and their wings 30 are of the same size and proportions and differ solely in the fact that the cores 31 extend in opposite directions from the respective heads. In other words the flat sides of the cores are parallel and toward each other as will be apparent by referring particularly to Figure 1.

Arranged in advance of the heads 29 is a matrix 33 provided, in one face, with separate rounded recesses 34 and 35 respectively there being a longitudinal groove 36 in the bottom of each of these recesses and in line with the lower portion of the adjacent head 29.

The cams 20 and 21 are so shaped and proportioned that, during the continuous rotation of gear 18, one of the heads 29 will be advanced while the other head is being retracted. As each head is advanced the wing 30 first enters the recess in advance thereof after which the core 31 enters said recess and is followed by the lower portion of the head 29 which enters and is guided by the groove 36.

Collar 9 is provided with a longitudinal flange 37 extending from the bar toward the furnace 2 and having a longitudinal slot 38. Extending downwardly from the bar adjacent the ends of the flange 37 are oppositely disposed former dies 39 and 40 respectively, each of these former dies having its lower end rounded to conform with the contour of one of the recesses in the matrix, and each of the former dies also having a slot 41 extending upwardly thereinto from its lower end and sufficiently large to receive one of the wings 30 and heads 29. The former dies 39 and 40 are spaced apart such a distance that when the bar 9 is at one extreme position, as shown for example in Figure 1, the former die 40 will be seated in the recess 34 whereas, when the bar 9 is in its other extreme position the former die 39 will be seated within the recess 35. Thus it will be seen that during the back and forth oscillation of bar 9 the former dies will be successively seated within their respective recesses.

A reel 42 is supported at any desired

point above the apparatus for holding a circular coil of wire stock indicated at W. Guide wheels 43 can be provided for guiding the wire stock to the slots 38 in flange 37.

In operation one end of the wire stock is placed, for example, in recess 34 after which the former die 39, swinging laterally and downwardly against the upwardly extending portion of the wire, will force the wire downwardly into the recess 35. At this time the wing 30 is back of and removed from said recess 35 as shown particularly in Figures 3 and 4. Immediately following this operation the head 29 back of recess 35 is advanced so that the wing 30 enters the slot 41 in the former die 39 so that the parts assume the positions shown in Figures 5 and 6. Immediately thereafter the former die 39 swings upwardly away from the recess 35 and leaves the wing 30 in position over the bent portion of the wire W. As the former die 39 leaves the recess 35 the core 31, which has been gradually advancing with the head 29, assumes a position within the recess 35 and upon the bent portion of the wire as shown particularly in Figures 7 and 8. At the same time the lower projecting portion 32 of the head 29 is sliding within the groove 36. Further actuation of the mechanism will cause the die 40 to swing laterally and downwardly against the wire stock, causing the wire to bend over the former die 39 and downwardly into the recess 34 where it will be shaped between the former dies and the matrix as shown in Figures 9 and 10. As the former die 40 reaches this position the head and core in recess 35 are moved forwardly a sufficient distance to cause the projecting portions of head 29 to push against the formed loop of wire in recess 35 and thrust it out of the recess toward the inlet of the furnace. Immediately following this action the head and core begin to withdraw from recess 35 and, during such withdrawal, the other head 29 and its core 31 move into the recess 34 where the same action takes place as has already been described in connection with the recess 35. Consequently as the machine operates the wire is rapidly bent into a figure 8 coil and it is at the same time fed longitudinally from the matrix 33 so that the coil will enter the furnace 2 and be heated prior to being fed through an outlet 44 in the furnace to the header or other machine used in connection therewith.

Although the parts have been described and shown as arranged to receive wire fed downwardly to the matrix, it is to be understood that the angle of the working parts to the horizontal can be varied to suit the conditions under which the machine is to be used.

It is also to be understood that various changes may be made in the mechanism used

for operating the several parts, it merely being essential that the former dies, heads and cores operate in properly timed relation.

5 What is claimed is:

1. A machine for bending wire into a figure 8 coil including a stationary shaping element having separate stock receiving recesses, shaping cores movable into the respective recesses, means for advancing and retracting the cores alternately, and separate forming dies for bending stock successively over the respective cores and into the recesses.

15 2. The combination with a die having spaced recesses for receiving stock, cores movable into and out of the respective recesses, and means for alternately actuating the cores, of separate means for successively bending stock within a recess prior to the insertion of a core and for bending the stock over the core subsequent to the insertion of the core.

25 3. A machine for bending wire stock into a figure 8 coil, including a die member having separate recesses, of a former die for bending stock within the recess, means movable into the recess for holding the bent stock in position therein, a core movable to position into engagement with the bent stock, a former die movable against the stock to bend it over the core and into the other recess, and means movable with the core for shifting the bent portion of the stock from the recess.

35 4. A machine for bending wire stock into a figure 8 coil, including a matrix having spaced recesses, separate former dies movable into the respective recesses, cores mounted for movement into and out of the respective recesses, a holding portion movable with each core, each former die having a slot for the reception of the holding portion of one of the cores, and means for actuating the former dies and cores in properly timed relation to bend the wire stock in one of the recesses between the matrix and one of the former dies, advance one of the holding means into said recess to position within the former die and above the bent portion of the stock, withdraw the former die from engagement with the stock, position the core within the recess and upon the bent portion of the stock, and to shift the other former die to position against the stock to bend it over the core and into the other recess.

50 5. A machine for bending wire stock into a figure 8 coil including a matrix having spaced recesses, separate heads movable into the respective recesses, cores carried by the respective heads, separate former dies movable into the respective recesses, each die

being shaped to receive one of the heads therein, and means for operating the former dies and heads to successively bend wire stock within one of the recesses between the matrix and one of the former dies, advance one of the heads into engagement with the bent stock in the recess, withdraw the former die from engagement with the stock in the recess, advance the head to position the core upon the bent portion of the stock, shift another former die against the stock to bend the stock over the core and into the other recess, press the head against the bent stock to eject it from its recess, and then retract the head from engagement with the stock and from the recess.

6. In a machine for bending wire stock into a figure 8 coil, a matrix having separate recesses, connected former dies, means for imparting oscillation to both former dies simultaneously to position them successively within the respective recesses, cores, and means for moving the cores into the respective recesses subsequent to the insertion of a former die thereinto and for withdrawing the core from said recess subsequent to the withdrawal of the former die therefrom.

7. The combination with a heating furnace having an inlet, and means for supporting a supply of wire stock, of means interposed therebetween for simultaneously shaping the wire stock into a figure 8 coil and shifting the stock into the furnace inlet.

8. The combination with a heating furnace and means for supporting wire stock, of means interposed therebetween for bending the stock into a figure 8 coil and feeding the coil into the furnace, said means including a matrix having spaced recesses, oscillating former dies for alternate insertion into the respective recesses, cores mounted for reciprocation into and out of the respective recesses in properly timed relation with the former dies, and means movable with the cores for ejecting shaped stock from the recesses.

9. A machine for forming wire stock into a figure 8 coil, including a matrix having separate recesses, slotted former dies, means for actuating said dies simultaneously to position them successively into the respective recesses to shape stock, heads mounted for reciprocation, means for actuating the heads to advance and retract them relative to the respective recesses, a core movable with each head, and holding means in advance of each of the cores.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature.

WILLIAM L. CLOUSE.