(No Model.) 4 Sheets—Sheet 1.

A. H. HIEATZMAN & A. O. BABENDREIER.

WIRE BENDING MACHINE.

No. 538,213. Patented Apr. 23, 1895.

Fig. 8.

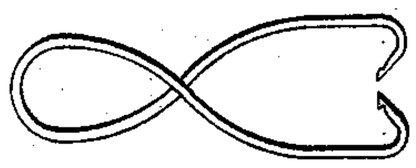
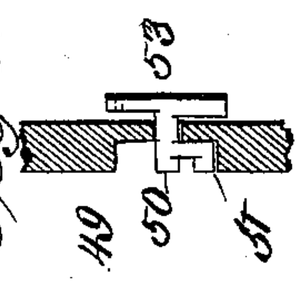


Fig. 7.



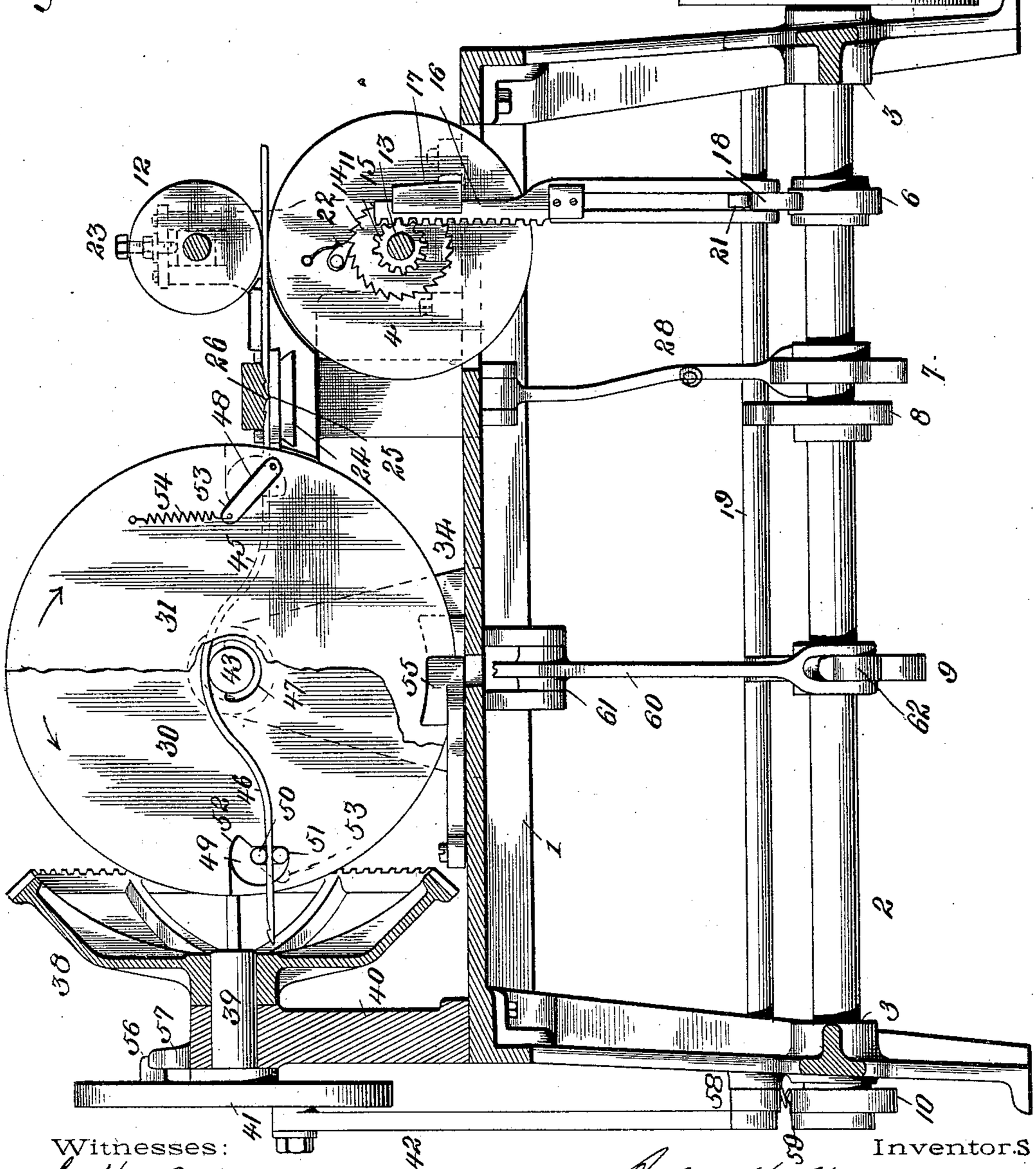


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Fig. 3.

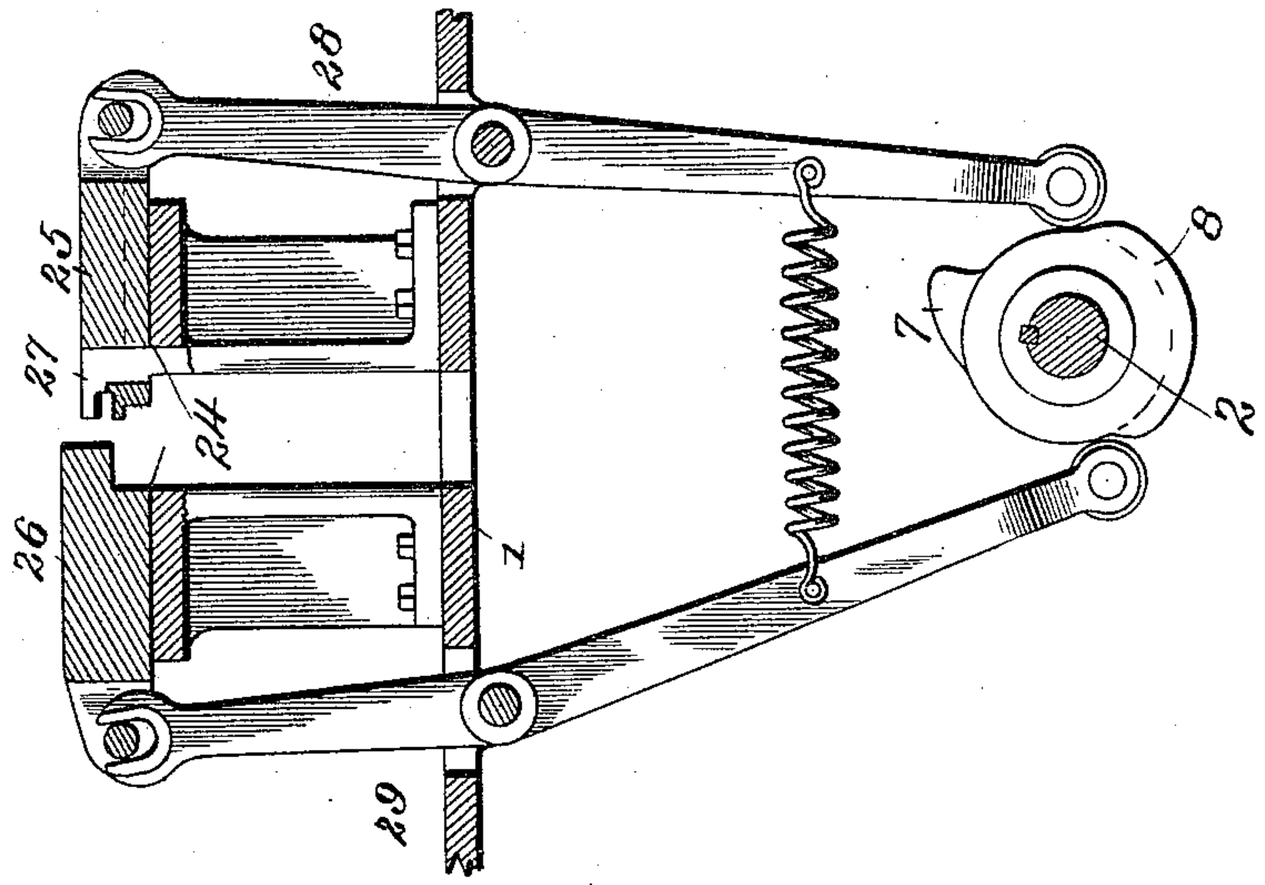
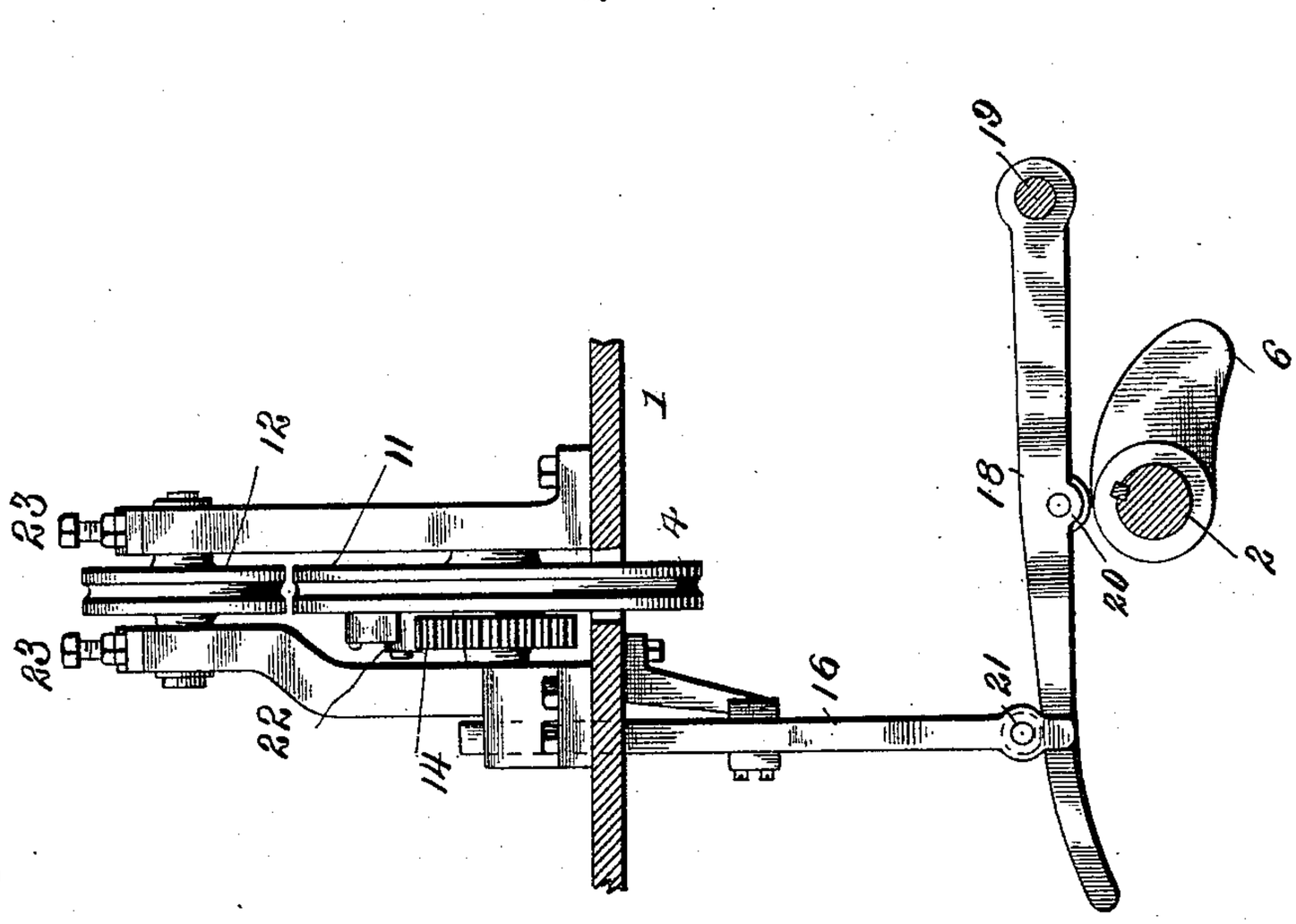


Fig. 2.



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WIRE BENDING MACHINE.

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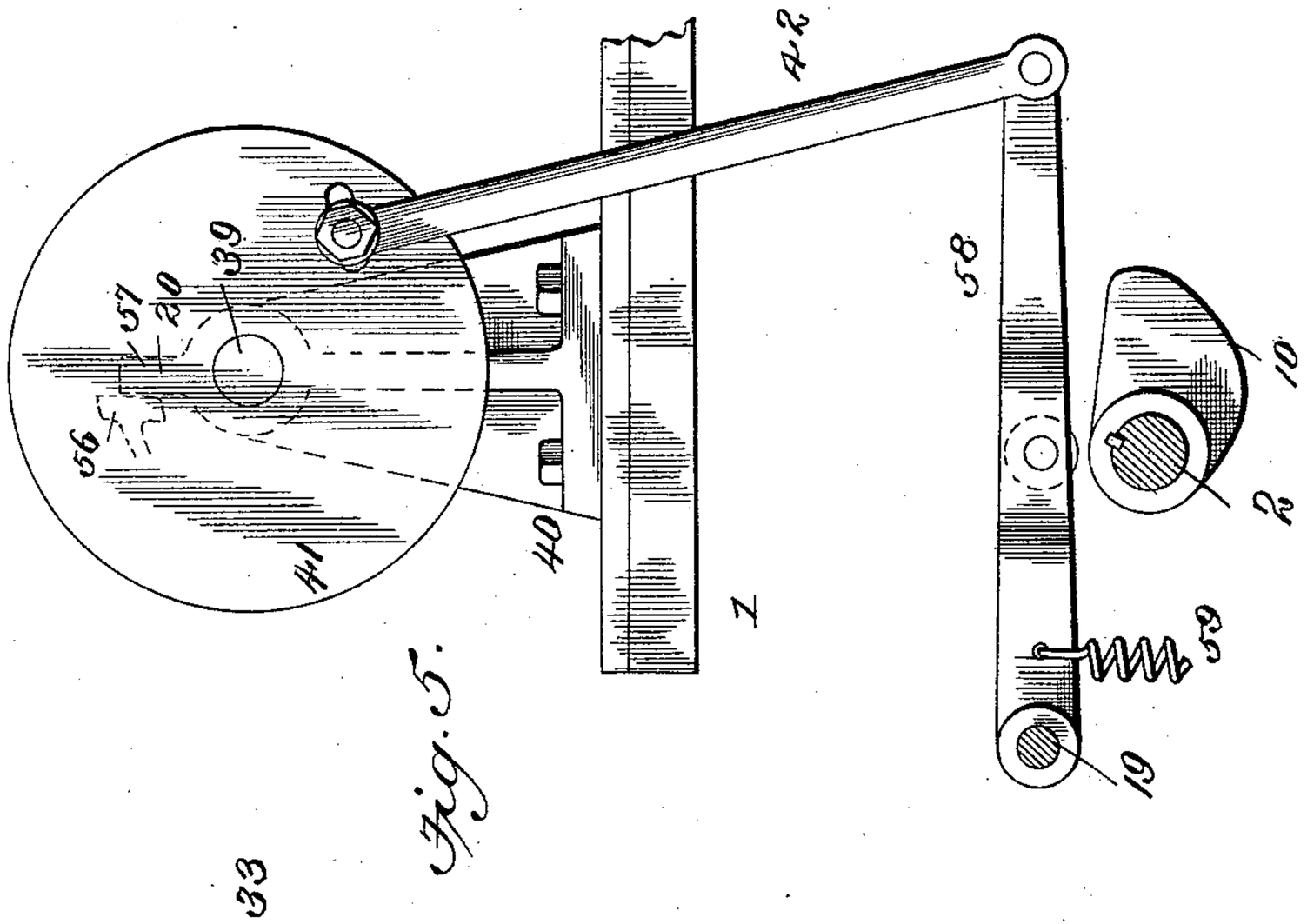
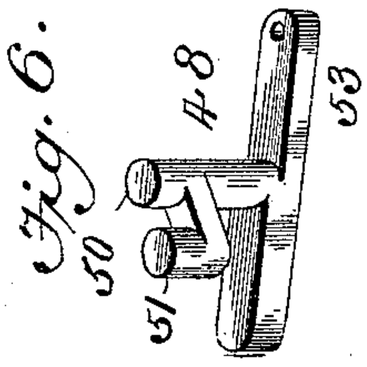


Fig. 5.

Fig. 6.



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(No Model.) 4 Sheets—Sheet 4.

A. H. HIEATZMAN & A. O. BABENDREIER.

WIRE BENDING MACHINE.

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Fig. 10.

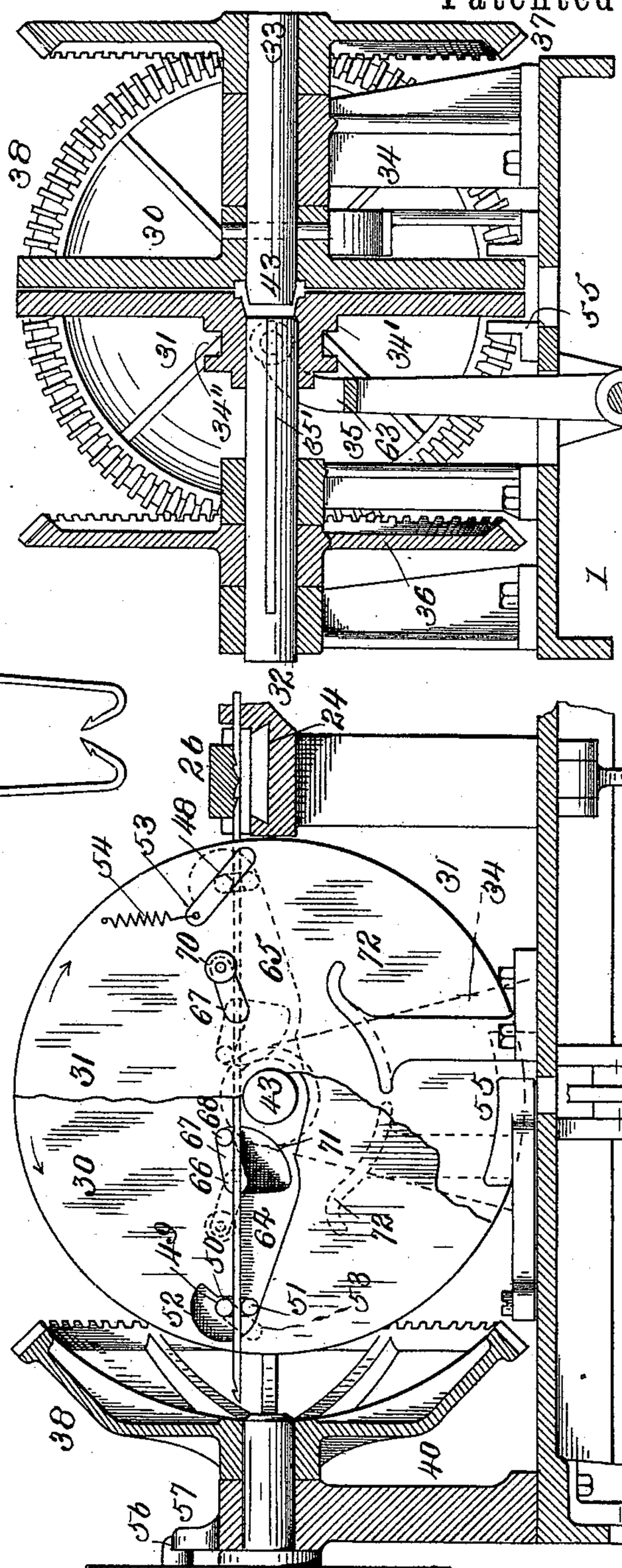

Fig. 12.

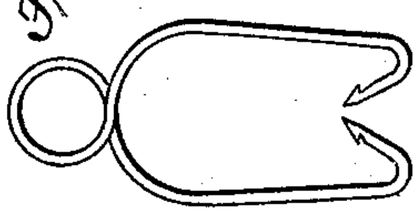

Fig. 11.

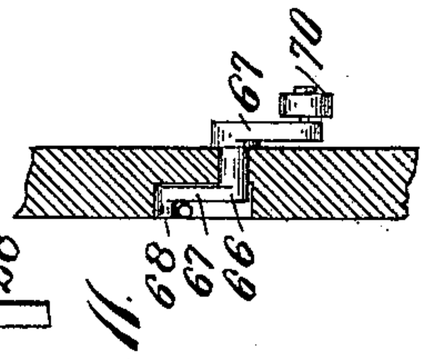

Fig. 9

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UNITED STATES PATENT OFFICE.

ARTHUR H. HIEATZMAN AND ARTHUR O. BABENDREIER, OF BALTIMORE, MARYLAND; SAID BABENDREIER ASSIGNOR TO SAID HIEATZMAN.

WIRE-BENDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 538,213, dated April 23, 1895.

Application filed January 21, 1895. Serial No. 535,732. (No model.)

To all whom it may concern:

Be it known that we, ARTHUR H. HIEATZMAN and ARTHUR O. BABENDREIER, citizens of the United States, and residents of the city of Baltimore, in the State of Maryland, have invented certain new and useful Improvements in Wire-Bending Machines, of which the following is a specification.

Our invention relates to a machine for bending wire so as to form hooks which are used as meat hooks and as a substitute for the ordinary string used for hanging meat.

Heretofore it has been customary in preparing salt meat, particularly for market, which is designed to be kept for a length of time, to tie a piece of tarred rope into it so that it may be hung up. This has many objections, and our machine is designed to make a wire hook which may be substituted for the rope.

Reference is made to the accompanying drawings, in which—

Figure 1 is a side elevation of the machine partly in section. Fig. 2 is a rear elevation of the wire feed mechanism. Fig. 3 is a transverse section of the barbing mechanism. Fig. 4 is a transverse section through the wire bending mechanism. Fig. 5 is an end elevation of the cam, levers and disk by means of which power is communicated to the bending mechanism, showing stop device. Fig. 6 is a perspective view of the mechanism by which the ends of the hook are bent. Fig. 7 is a vertical section of the bending plates showing the hook bending device in side elevation. Fig. 8 is a plan view of the hook as made by the machine. Fig. 9 is a vertical section of portions of a modified form of wire bending machine showing parts broken away to illustrate the interior views. Fig. 10 is a transverse section of the apparatus shown in Fig. 9 through the center of the mandrel. Fig. 11 is a transverse section through the end-bending device shown in full in Fig. 9. Fig. 12 is an elevation of the form of hook made by the machine shown in Figs. 9 and 10.

Referring to Fig. 1, 1 is the frame of the machine on which the wire bending mechanism is mounted. 2 is a counter shaft mounted in the bearings 3—3 in the legs of the frame and provided upon the exterior with fast and loose pulleys 4 and 5 for communicating power to the machine. On the shaft 2 are mounted a series of cams 6—7—8—9—10. 6 actuates the wire feed; 7 and 8, the barbing device; 9, the device for releasing the hook from the turning space; and 10 the actuating mechanism for the hook-bending device. The feed of the machine is accomplished by means of two grooved disks 11 and 12 between which the wire passes and is fed forward to the machine. It is necessary that this feed should be intermittent, that a measured quantity of wire should be fed into the machine and the feed should then stop and remain stationary until the hook-bending mechanism has completed its work. It is also necessary that it should feed forward a measured length of wire suitable for making a hook. This is accomplished in the following manner: The feed disk 11 is made of the desired diameter. It is loosely mounted upon a shaft 13 which is suitably journaled upon the frame of the machine. Upon the same shaft is keyed a ratchet wheel 14 and a pinion 15. 16 is a rack meshing with the pinion 15 and arranged in a suitable guide 17. This rack is connected at its lower end to a lever 18 shown in side elevation in Fig. 2. The lever 18 is pivoted upon a rod 19 which extends from side to side of the machine between the legs. On the lower side of the rod 18 is a cam roller 20 located in position to bear upon the cam 6 and receive motion from it. The lower end of the rack bar 16 is forked and within this fork is mounted a friction roller 21 which bears upon the upper surface of the cam lever 18 and by it vertical motion is communicated to the rack 16. 22 is a pawl secured upon the side of the feed disk 11 and engaging the ratchet wheel 14. The disk 12 stands immediately above the disk 11 and is mounted in suitable bearings upon the bed of the machine and is provided with a set screw 23 for the purpose of adjusting the tension of the feed upon the wire. After the wire passes the feed rolls it enters the barbing device. It is desirable that the points of the hook should at least be sharpened and it may be necessary to give them a barb. Any desired shape, however, may be given to them by a mech-

anism similar to that shown in Figs. 1 and 3, in which Fig. 1 is a longitudinal section, and Fig. 3 is a transverse section. The principal device consists of a pair of cutters which mesh with one another and which are arranged at opposite sides of the machine. They are mounted in dovetail slides 24—24 on suitable supports and in line with the wire as fed from the feeding device. They consist of an upper and a lower cutter.

Referring to Fig. 3, 25 is the lower cutter provided on its extremity with a transverse groove into which the wire enters and by which it is supported. The upper surface of the die 25 is grooved in the manner shown in Fig. 1 to represent the lower portion of the barbs. 26 is the upper die which fits the grooves of the die 25 and has corresponding and reverse formation. 27 is a drop slot cut through the die 25 immediately behind its cutting surface and provided for the purpose of allowing free passage for the piece of wire cut out to form the barb. The dies 25 and 26 are reciprocated by means of the levers 28 and 29. These levers are actuated by the cams 7 and 8. The lever 28 actuated by the cam 8 is first thrown into position for cutting by the elevation on that cam and maintained there by said elevation, which is of the same radius throughout, until the die 26 has finished its work. The die 26 is brought into action by the cam 7 but only after the die 25 has been brought up to its full position where it rests stationary while the die 26 is doing its work. The cam 27 presses the die 26 across the top of the wire cutting the barb. Both cams then recede simultaneously, leaving the wire free. 30 and 31 are two disks mounted face to face on two counter-shafts 32 and 33. Said counter shafts are journaled in suitable bearings 34 and 35. The counter-shafts 32 and 33 are mounted in the same axial line, end to end. On the shaft 33 is rigidly secured the disk 30 and on the shaft 32 is secured the disk 31. The shaft 33 protrudes beyond the disk 30 and is made conical on its end so as to form a mandrel 43. The center of the disk 31 is provided with a conical hole 44 in which the mandrel 43 enters. The disk 31 is provided on its hub 34′ with a circular groove 34″ and the shaft 32 has upon its side a feather 35′, which slides in a slot in the interior of the hub of the gear wheel by which it is driven. On the shaft 32 is mounted a bevel gear 36, and on the shaft 33 a bevel gear 37. These two gears both mesh with a bevel gear 38 shown in Fig. 1 as mounted upon a counter shaft 39 suitably supported on a journal 40 mounted upon the body of the machine and driven by a disk 41, rod 42, and cam 10.

Viewing Fig. 1, the disks 30 and 31 face one another and each is provided on its face with a groove 45 and 46 respectively, extending from the periphery to the center in a curved line as shown in this figure, the curve rising so as to bring the groove to the center of the disk at the edge of the mandrel 43. Surrounding the mandrel 43 in each disk is a semi-circular groove 47 which together form a circular groove of the size of the wire. The groove 45 is in the disk 30 only, while the groove 46 is in the disk 31 only. At the point where these grooves approach the circular groove 47 they taper down to a semi-circular groove so that a continuous groove of the diameter of the wire will be formed extending across the face of the disk. 48 and 49 are the devices by means of which the ends of the hook are bent. The device is shown in detail and perspective in Figs. 6 and 7. It consists of a stud passing through the disks 30 and 31 respectively, and journaled therein. The stud 50 is provided with an arm 51 having a lug upon its extremity and forming with the stud 50 a space sufficient for the admission of the wire between two posts. 52 is a countersunk recess in the face of the plate 31 in which the stud 50 and the arm 51 revolve. 53 is an arm secured to the extremity of the stud 50 on the outside of the plates 31 and 32. One end of the arm is secured to a spring 54 by which the device is held in position suitable to receive the wire without bending it as shown in Fig. 1, with reference to plate 31. The opposite end of the arm is adapted to engage a cam and bend the ends of the hook. 55 is a cam or lug having an inclined surface secured to the bed of the machine and lying in the path of the lower end of the arm 53. The hook is formed or bent into shape by means of the cam 10, rod 42, and disk 41, which are connected to the gear 38. It is important that when the disks return to a condition of rest after the bending is completed that they should come together with positiveness to a position where the grooves 45 and 46 will be coincident and permit the wire to be passed freely between the disk by the feed. In order to secure this result a lug 56 is cast on the back of the disk 41 which engages a pin or lug 57 on the journal-box of the counter-shaft 39.

Referring to Fig. 5 it will be seen that the rod 42 is connected at its extremity with a cam lever 58 which is held down by means of a spring 59. Both gravity and spring pressure, therefore, will keep the lug 56 on the back of the disk 41 in contact with a pin 57 at all times except when the cam 10 is moving the disk.

Referring to Fig. 4, 9 is a cam by which the disk 31 is withdrawn from contact with the disk 30. It consists of three-quarters of a circle having a quick drop and a slow rise. 60 is the cam lever pivoted at 61 provided with a cam roller 62 on its extremity which bears upon the cam 9. At its upper end it is forked at 63 and the forks engage a circular groove 34″ in the hub of the disk 31. Thus, reciprocating motion is communicated to the disk 31 under the influence of the cam 9.

Referring to Fig. 9, the disks 30 and 31 in this figure are provided with a modified con-

struction of that shown in Fig. 1. The slots through which the wire passes are wide slots cut in the face of the disks, one-half of the length of the slot being in each disk. The slot is narrow at the ends and widens out in the center so as to pass the mandrel at both sides. 64 shows the shape of the slot in the disk 30 and 65 the slot in the disk 31. This slot is provided for the purpose of giving to the hook a form such as is shown in Fig. 12. The shoulder below the loop is made by the action of a bending device somewhat similar to that employed for bending the points and which has been heretofore described. It consists of a stud 66 journaled in the plate 30 and having an arm 67 extending laterally in a quadrant shaped recess 71. On the extremity of the arm 67 is a pin 68 which bears upon the wire and bends it. 69 is an arm on the back of the plate 30 secured to the stud 66 and on its end it carries a friction roller 70, which, when making contact with the cam 72, causes the stud 66 to rotate and the arms 67 and studs 68 to bend the wire. The device for bending the end of the wire is similar to that hereinbefore described and all the other portions of the machine are the same.

The operation of the device is as follows: A suitable length of wire is fed into the machine by the feed. The wire passes into the groove 45 between the posts of the point-bending device 50 and 51, thence through the groove passes over the center above the mandrel 43 and out through the groove 46, again passing through the posts 50 and 51 of the point-bending device and protrudes a suitable distance beyond, corresponding to the distance of the barb cutting device from the disks on the side next the feed. The cams 7 and 8 then come into play and throw the die 25 into position by the cam 8, then throw the die 26 across the die 25 by the cam 7, thus cutting a double barb as shown in Fig. 1, both on the end of the piece of wire which is between the plates and also upon the extremity of the wire in the feeding pipes. The cam 10 next comes into operation causing the rotation of the bevel gear 38 and the bevel gears 36 and 37 in opposite directions. The wire held in the grooves 45 and 46 in the two disks 30 and 31 will be wrapped around the mandrel 43 still held in said grooves by the plane surface of the opposite disk. They will at the same time be withdrawn through the end-bending device by so much as the wire may be taken up in wrapping around the mandrel. When this has been accomplished the disks will have made nearly a quarter of a revolution and the extremities of the arms 53 will come in contact with the stationary cams 55, rotate the studs 50 and 51, and bend the ends of the wire into the form shown in Fig. 8. When this has been accomplished the hook will have been completed. It now becomes necessary to release the hook from the bending device. This is accomplished by the reversal of the motion of the disks to the position shown in Fig. 1 and a simultaneous withdrawal of the disk 31 under the influence of the cam 9, cam lever 60, and fork 63. The loop of the hook is wound upon the mandrel 43 which is conical and as the disk 31 is withdrawn one extremity of the hook is held by the point-bending device on disk 31 while the other extremity is held by the point-bending device on 30. The bend occurs around the mandrel in such a manner that when the disk 31 recedes it will open the joint of the loop on the mandrel and tend to release it at the same time that it will pull the loop off of the mandrel. The pressure of the loop upon the mandrel will also have a tendency to release it in consequence of the conical shape of the mandrel and as the disks 30 and 31 begin to return to their normal positions at the instant at which disk 31 begins to recede the loop around the mandrel 43 is instantly loosened and easily slips off. As soon as the device has returned to the position shown in Fig. 1 the bent wire or hook will release itself from the point-bending device and fall on to the table.

It will be observed that the supporting pieces for the barb forming device are separated from one another and that the dies recede immediateiy upon the formation of the barb and before the disks begin to turn, so that the protruding extremity of wire which has been barbed by the barbing device will not be interfered with when carried downward by the disks.

What I claim, and desire to secure by Letters Patent, is—

1. In a wire bending machine the combination of two plates one of which is provided with a groove suitable to receive a wire and adapted to be turned against the face of the opposite plate, with means for holding the wire in suitable position to be bent into form while held in the groove of one plate by the other.

2. In a wire bending machine the combination of two plates each of which is provided with a radial groove adapted to receive a wire passing between the plates and a center mandrel passing through the centers of the plates, means for rotating the plates in opposite directions from one another and thereby bending a wire held in the grooves of the plates around the mandrel, said wire being held in said grooves by the face of the opposite plate.

3. In a wire bending machine the combination of two plates each provided with a radial groove rotating about a center mandrel, said radial groove in each disk being curved from the periphery to the center so as to be tangent to the exterior of the mandrel.

4. In a wire bending machine the combination of two plates each provided with a radial groove and rotating about a mandrel as a center in opposite directions, the radial grooves being tangent to the mandrel, and a device for bending the extremities of the wire which consists of a stud pivoted in each disk having

two lugs between which the wire passes when entering the groove, and one of which is rotated about the other by the motion of the disks in turning.

5. In a wire bending machine the combination of a feed mechanism supplying a measured length of wire to the bending device, a cutter for severing the measured length of wire from the feed, a pair of plates each provided with a radial groove rotating about a central mandrel, said grooves being tangent to the mandrel, and the disks rotating in opposite directions from one another, substantially as described.

6. In a wire bending machine the combination of a feed mechanism feeding a desired length of wire to the bending machine, a barbing device consisting of a pair of reciprocating dies moving in opposite directions toward and away from one another and of such shape as to sever the wire which lies between them and cut a barb upon it, and a pair of plates each provided with radial grooves and rotating about a central mandrel in opposite directions, said radial grooves being tangent to the mandrel, substantially as described.

7. In a wire bending machine the combination of a pair of plates mounted face to face and having a central mandrel each plate being provided with a groove which is tangent to the mandrel, means for rotating said plates in opposite directions, and means for withdrawing one of said plates from the other, substantially as described.

8. In a wire bending machine the combination of two plates each provided with a groove extending from the periphery to the center, said plates being mounted on the same axis and rotating in opposite directions around a mandrel, and a stud in each plate for bending the ends of the wire inwardly in opposite directions.

9. In a wire bending machine the combination of two plates mounted upon an axis face to face, each plate being provided with a groove extending from its periphery to its center, said grooves being continuous from one plate to the other, and means for rotating said plates in opposite directions.

10. In a wire bending machine the combination of a wire feeding device, two plates mounted upon an axis face to face, each plate being provided with a groove which is continuous from one plate to the other, and means for rotating the plates in opposite directions.

11. In a wire bending machine the combination of a wire feeding device, a cutting and barbing device located between the feeding device and the wire bending device, and two plates mounted upon an axis, each plate being provided with a groove extending from the periphery to the center, said grooves together forming a continuous groove from one plate to the other, and means for rotating said plates in opposite directions.

12. In a wire bending machine the combination of a wire feeding mechanism, a cutting or barbing device located between the wire feed and the bending device, two plates mounted upon an axis face to face, each plate being provided with a groove extending from the periphery to the center, said grooves together forming a continuous groove from one plate to the other, and means for rotating said plates in opposite directions.

13. In a wire bending machine the combination of two plates having a common axis and mounted face to face and having a groove between them one radial half of which lies wholly in one plate and the other radial half in the other plate, said grooves passing from one plate to the other tangent to the mandrel so as to be continuous.

14. In a wire bending machine the combination of two plates having a common axis and mounted face to face, each plate being provided with a radial groove extending from the periphery toward the center and each plate having a semi-circular groove surrounding its center and forming with the grooves in the two plates a continuous groove from side to side of the plates and around the center.

15. In a wire bending machine the combination of two plates each provided with a groove and rotating about a mandrel as a center in opposite directions, said plates being each provided with an auxiliary device for bending the ends of the wire inwardly in opposite directions in the plane with the main body of the hanger, said auxiliary bending device consisting of a stud passing through the plate and provided with an arm on each end, one arm engaging the wire and the other being operated by contact with the stationary projection or cam when the plates are revolved.

16. In a wire bending machine the combination of two plates mounted upon a common axis face to face, each provided with a radial groove which lies wholly in one plate, said grooves meeting at or around the center of the plates and together forming a continuous groove from one side to the other of the plates.

17. In a wire bending machine the combination of two plates mounted upon a common axis, said plates being provided with a continuous groove between them, means for rotating said plates in opposite directions, and means for separating said plates automatically, as and for the purpose specified.

18. In a wire bending machine the combination of two plates provided with a continuous groove between them rotating about a central mandrel in opposite directions, a stud on each plate on opposite sides of the mandrel for bending the wire more fully around the said mandrel, substantially as described.

19. In a wire bending machine the combination of two plates provided with a continuous groove between them and rotating about a central mandrel in opposite directions, one plate being provided with a stud pivoted in it

and having an arm on each end, the interior arm being provided on its end with a stud, and a stationary cam located in the path of the exterior arm and so shaped as to cause said arm to be moved as the plate rotates and thereby bend the wire, substantially as described.

Signed at Baltimore city, in the State of Maryland, this 26th day of December, A. D. 1894.

ARTHUR H. HIEATZMAN.
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