

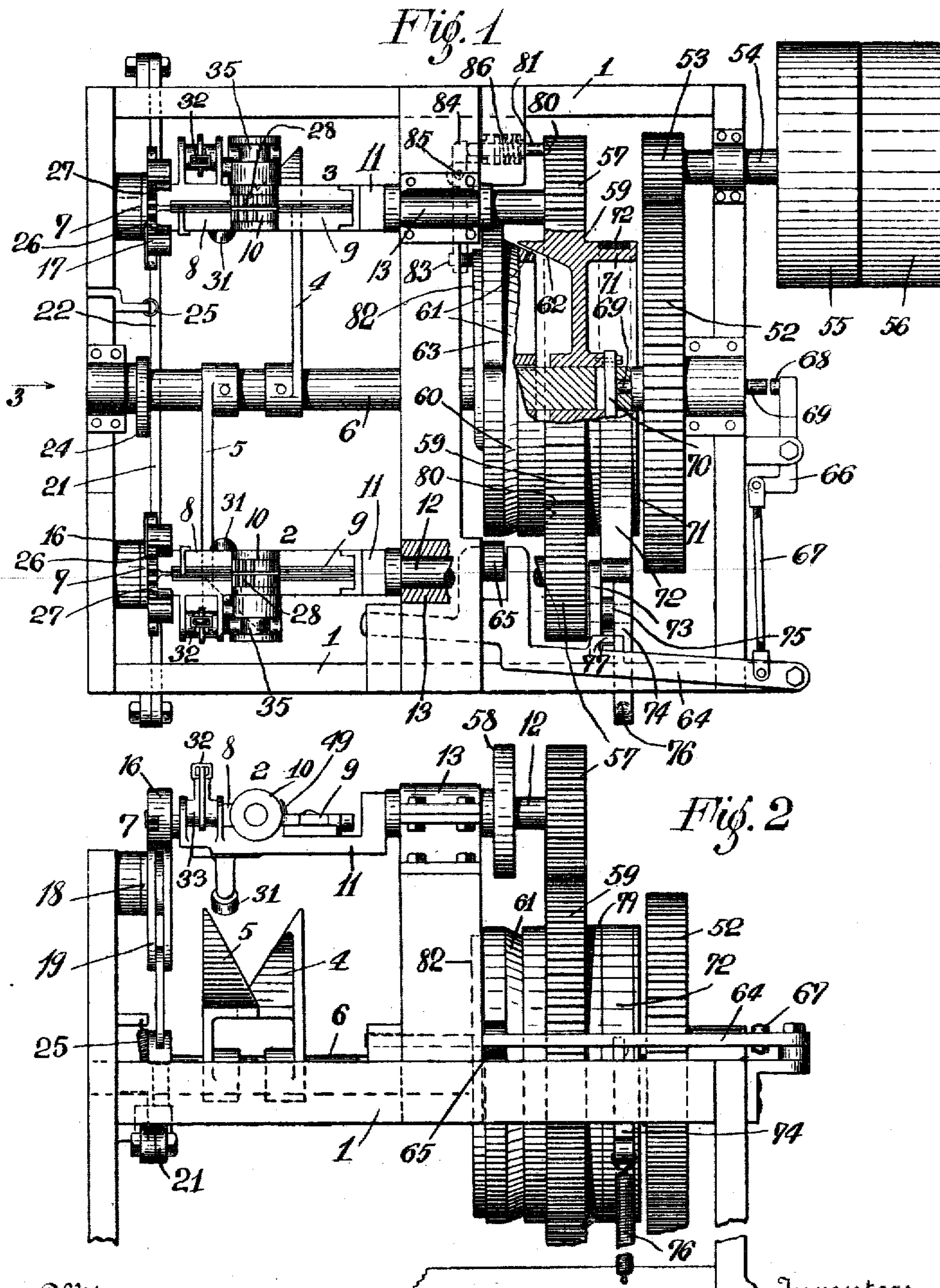
No. 811,565.

PATENTED FEB. 6, 1906.

A. KENT & R. ORR.
WIRE BENDING AND TWISTING MACHINE.

APPLICATION FILED MAR. 11, 1905.

4 SHEETS—SHEET 1.



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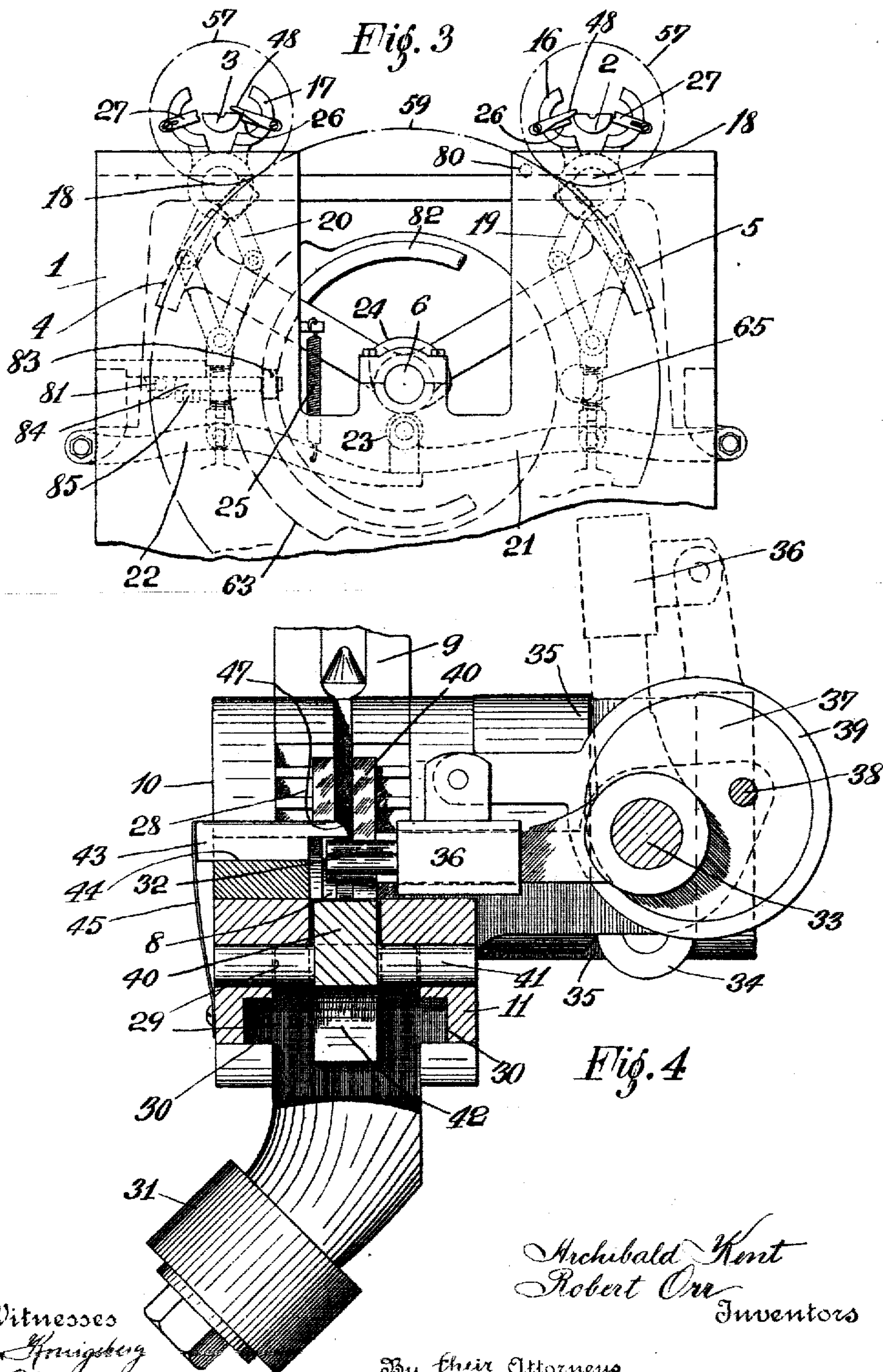
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4 SHEETS—SHEET 2.



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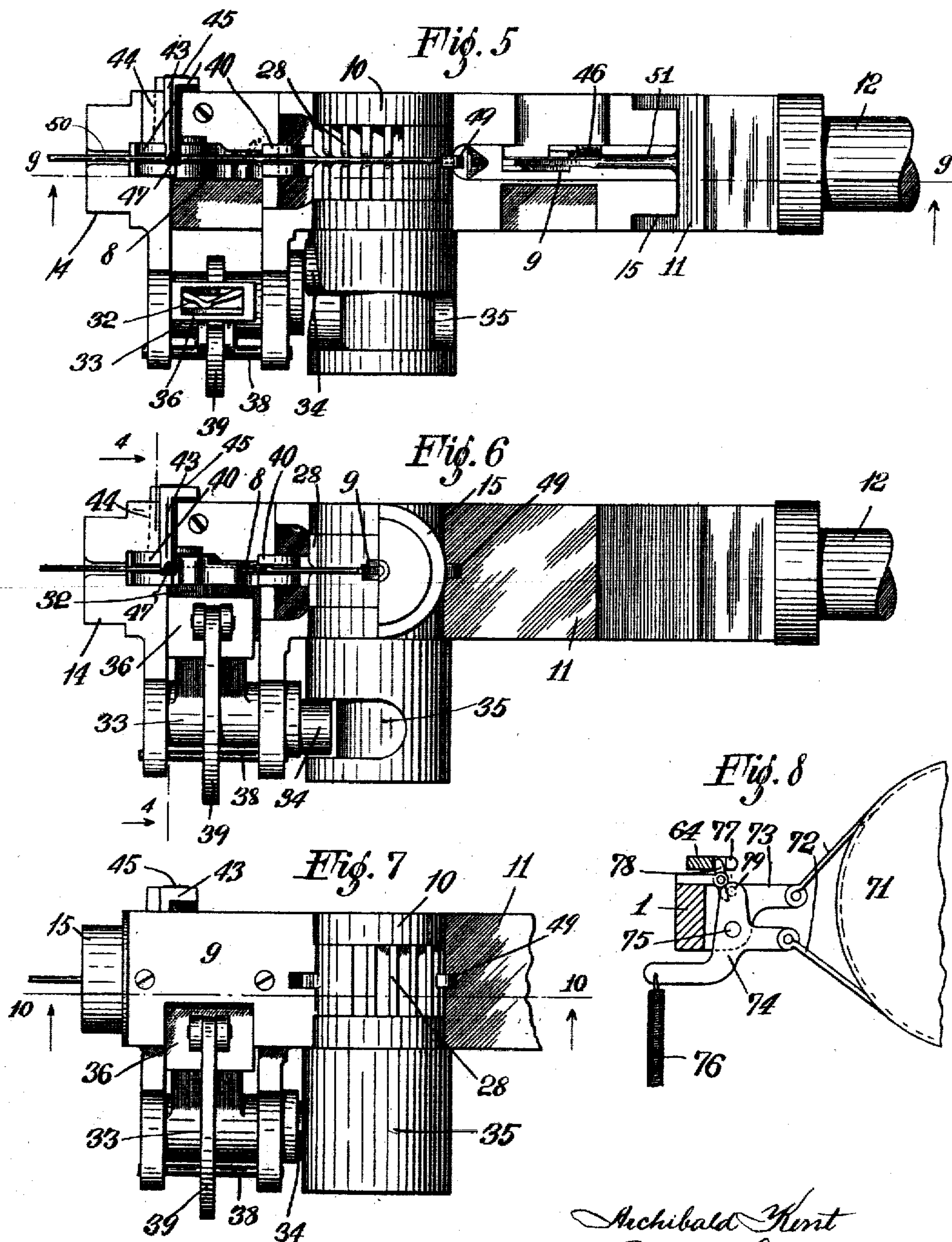
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4 SHEETS—SHEET 3.



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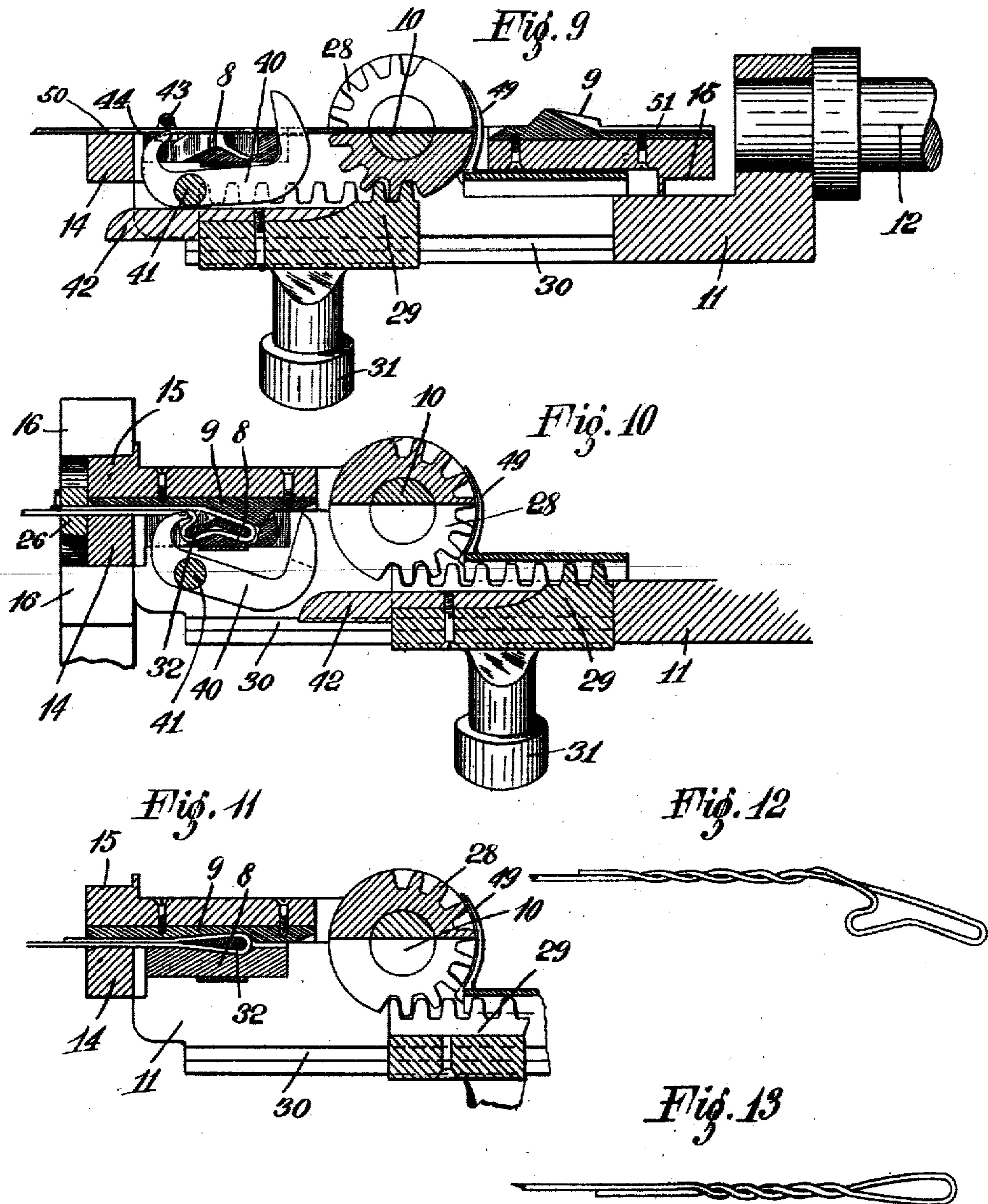
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4 SHEETS—SHEET 4.



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UNITED STATES PATENT OFFICE.

ARCHIBALD KENT AND ROBERT ORR, OF NEW YORK, N. Y.; SAID KENT
ASSIGNOR TO SAID ORR.

WIRE BENDING AND TWISTING MACHINE.

No. 811,565.

Specification of Letters Patent.

Patented Feb. 6, 1906.

Application filed March 11, 1905. Serial No. 249,581.

To all whom it may concern:

Be it known that we, ARCHIBALD KENT and ROBERT ORR, citizens of the United States of America, and residents of the borough of Brooklyn, city of New York, county of Kings, and State of New York, have invented certain new and useful Improvements in Wire Bending and Twisting Machines, of which the following is a specification.

The present invention relates generally to a combined wire bending and twisting machine used in the manufacture of hooks and loops for bale-ties.

In the prior art it has been customary to bend the wire around pins or the like by means of cam-shaped or otherwise-formed members adapted to act on certain portions of the wire to cause it to assume the proper shape. With this construction some difficulty has been encountered, especially after the parts of the machine are somewhat worn, or even when a slight discrepancy exists in the wire to be bent. This difficulty can be traced to the fact that the wire is not held positively and at all points by the wire-bending members.

The object of the present invention is to avoid this uncertainty and to produce a machine positive in its action. This is accomplished by constructing the wire-bending members in the form of two dies having grooves which when brought together form a closed mold, whose interior conforms substantially to the configuration of the blank desired and closely embraces the same. In other words, this mold which is used for bending the wire is very similar to molds used for shaping fluid metal, &c. It is obvious that the particular form of this mold may vary widely, depending upon the shape of the blank desired and the class of work to be produced. In the present instance the two dies composing the mold are hinged together, one being stationary and the other movable, and suitable means are provided for opening and closing the mold. In addition to the foregoing there is also provided a core member around which the wire is bent and which is adapted to be moved into and out of position between the dies at the proper periods. The core is provided with an automatic stripping mechanism which removes the blank from

the said core member when the mold is opened. The mold may further be provided with such auxiliaries as may be found necessary to properly bend the wire, depending upon the shape desired. In the construction shown in the accompanying drawings, which is the preferred form, there are two such heads carrying wire-bending members, though the invention is by no means limited to a construction involving two heads, nor is the invention limited for certain purposes to a construction involving a mold, inasmuch as the general structure of the machine possesses new and useful features in itself. It is preferred, however, to divide the prescribed cycle of the machine into three parts, during the first period of which the heads are closed and the wire bent, and the second period during which the heads are rotated in unison and the wire twisted, and the third period during which the heads are opened and the completed blanks stripped off the machine. Preferably the main shaft extends centrally of the machine, on either side of which are arranged the two bending and twisting heads, which perform all the work on the wire to be acted upon. Cams or wipers or other suitable means are arranged on the main shaft, one of which acts to close the heads successively during the first period of the cycle of the machine, after which the driving mechanism for the heads is automatically thrown in and both heads rotated in unison during the second period and then brought to a stop and, finally, the other wiper or cam acts to open the heads successively during the third period. The main shaft is therefore driven continuously during the cycle of the machine, while the heads are driven intermittently. The cycles of the machine may be continuous or the machine may stop after each complete cycle and then start again by the depression of a foot-treadle mechanism or other means, in a well-known manner. It is preferred to have the machine run continuously, and about nine thousand blanks can be produced per day in this way. Means are also provided for pinching the free end of the wire during the twisting operation.

Other features of construction and combinations of parts will appear as the specification proceeds.

In the accompanying drawings the invention has been embodied in a concrete and preferred form for the sake of illustration; but the construction shown admits of wide differences in construction without departing from the spirit of the invention.

In the said drawings, Figure 1 is a plan view of a machine embodying the invention with parts broken away and partly in section for the sake of clearness. Fig. 2 is a side elevation of the machine shown in Fig. 1, the lower part of the framework not being shown. Fig. 3 is a front view, largely diagrammatic, looking in the direction of the arrow 3 in Fig. 1. Fig. 4 is a transverse sectional view of the head on line 4 4 shown in Fig. 6. Fig. 5 is a plan view of one of the heads shown with the mold open. Fig. 6 is a view similar to Fig. 5 with the core member shown moved over the lower stationary die and with the upper movable die partly closed. Fig. 7 is similar to Figs. 5 and 6, but shows the mold closed. Fig. 8 is a detail view of the brake for assisting in stopping the power-transmission device on the main shaft, partly in section. Fig. 9 is a longitudinal vertical sectional view on line 9 9 of Fig. 5, showing the mold in its open position. Fig. 10 is a longitudinal vertical sectional view on line 10 10 of Fig. 7, showing the mold closed. Fig. 11 is a longitudinal vertical sectional view taken on a similar line to 10 10, but showing the other head of the machine. Fig. 12 shows the product of the mold illustrated in Figs. 4, 5, 6, 7, 9, and 10. Fig. 13 shows the product of the mold illustrated in Fig. 11.

Similar characters of reference indicate corresponding parts in the different views.

1 indicates a framework of any suitable construction for properly supporting the parts comprising the machine.

2 and 3 denote the two heads carrying the wire bending and twisting mechanism, opened and closed, respectively, by some suitable means, as the wipers or cams 4 and 5 on the main shaft 6.

7 is the wire-pinching mechanism.

Each wire bending and twisting member is preferably in the form of a mold composed of two dies 8 and 9, connected by means of the pivot or hinge 10. One of said dies—in this case the lower one, 8—is stationary, while the other die, in this case the upper one, is movable. In order to twist the wire, the head carrying the bending members is rotatable and consists of a bracket 11, having at one end the stud or shaft 12, mounted in the fixed bearings 13, while the other end is freely suspended. In order, however, to properly steady and guide the parts while the wire is being twisted, the wire-bending members or dies have their outer ends formed with semicircular parts 14 and 15, which when the mold is closed form a stub-shaft or stud, as shown best in Fig. 10. The

closed end of the mold is adapted to be clamped by the two jaws 16 and 17, forming a bearing for the outer or free end of the head during the twisting operation. These jaws are pivoted at 18 and are operated by the toggles 19 and 20, connected, respectively, to the pivoted levers 21 and 22, the former of which carries a friction-roll 23, bearing against the cam 24, mounted on the main shaft. The lever 22 is held up against the lever 21 by means of the spring 25, so that the roll 23 is held properly in contact with the cam 24, and whereby the clamping-jaws for both heads are moved simultaneously into position. The wire-pinching mechanism 7 is conveniently carried by these jaws, and consists of two pinching-fingers 26 and 27 for each head, whereby the free ends of the wire are held during the twisting operation.

Suitable means for opening and closing the mold are of course provided or for moving the movable die toward and away from the fixed die. Preferably the hinge or pivot carries a mutilated gear 28 or is provided with gear-teeth meshing with a reciprocating rack 29, sliding in the ways 30 of the bracket 11. The rack is provided with a roll 31, adapted to be moved by the wipers or cams 4 and 5 to open and close the mold. The wire-bending members or the two dies will of course be properly shaped and grooved, the exact shape and detailed construction depending upon the shape of the blank desired, and may of course be widely varied. In the present case there is provided a core member 32, adapted to be moved into and out of position on the lower stationary die or to be moved into and out of position between the dies. The blank is bent around this core, which is moved into the mold after the wire is fed into the same. For the sake of economy of space and to reduce the number of parts as much as possible, this core member is pivoted on the pivot 33, located at right angles to the pivot 10, connecting the two ends of the mold. On this pivot 33 is mounted the roll 34, adapted to engage in the cam 35, mounted on the pivot 10.

A suitable stripper for stripping the finished blank off the core is provided, conveniently taking the form of a stripper member 36, surrounding the core and pivoted eccentrically on the pin 38, and operated by means of the eccentric 37 and eccentric-strap 39, the parts being so arranged that when the core moves out of position between the dies it recedes within the stripper member, thereby stripping the blank off the same, and when the core moves into position between the dies it emerges from said stripper member and is exposed so as to properly cooperate with the wire-bending dies.

In case it is desired to bend the blank inwardly and in a forward direction, as when forming a hook, a movable member 40 is pro-

vided in the lower die pivoted at 41 and moved downward by means of the cam 42, carried by the reciprocating rack 29, and moved upward so as to operate on the blank by means of the movable die.

Other auxiliaries may of course be provided in connection with the molds, such as, for instance, the spring-seated detent 43, sliding in the ways 44 and normally moved in over the lower die by means of the spring 45 and moved out by means of the inclined surface 46 on the movable die member cooperating with the inclined surface 47 on the spring-detent. Likewise the wire-pinching members may also carry a detent-finger 48. A stop 49 is provided, against which the wire is fed when the mold is open.

As previously stated, the exact configuration and shape of the parts comprising the mold will of course vary with the shape of blank desired, and this exact shape it is not considered necessary to describe in detail. Mention should be made, however, of the fact that such members as are in the path of the wire when it is fed should be grooved, such as the hinge 10 and movable member 40, as shown in Fig. 9, for instance. Also such other surfaces and members as do not act upon the wire, but are in the path of the same, as the surfaces 50 and 51 of the upper and lower dies, respectively, should be grooved.

The mold illustrated in Fig. 11 for forming the loop (shown in Fig. 13) is of course not provided with a movable member, as 40, for obvious reasons, nor with the cam 42. Except for the configuration of the dies and core member the construction of this mold is in all respects similar to the one just described.

It is needless to say that two heads could of course be had in the same machine constructed exactly alike; but in practice the machine would preferably be constructed with two heads of dissimilar construction.

The main shaft is preferably operated continuously by means of the gear 52 receiving motion from the pinion 53, mounted on the counter-shaft 54. This latter shaft will in the present instance carry a fast and a loose pulley 55 and 56.

Each head is provided with a pinion 57 and balance-wheel 58, the pinion 57 meshing with the gear 59, mounted loosely on the main shaft. A suitable clutch device must, of course, be provided for causing the gear 59 to partake of the motion of the main shaft at the proper intervals, and to this end there is mounted fast on the said main shaft a clutch member 60, having the inclined or other clutch surface 61. The gear 59 is provided with a clutch-surface 62, corresponding with the surface 61 and adapted to engage with the same. The gear 59 is further adapted to slide on the main shaft in any well-known way, and is caused to do so by means of the cam 63 on the main shaft and suitable means,

as the pivoted lever 64, having the friction-roll 65 and operating the bell-crank 66 by means of the rod 67, thereby causing the pin 68 to engage and push the rod 69, resting in the main shaft, inwardly. This causes the rod 69 to push against the pin 70, carried by the gear 59, thereby moving the clutch-surface of the said gear into contact with the clutch-surface on the member fast on the main shaft. When the cam 63 ceases to act on the lever 64, the parts of course disengage and the gear 59 stops. In order, however, to stop the gear 59 positively at a fixed point, suitable braking and stopping mechanism is provided. In the machine taken here as an illustration the gear 59 is provided with a friction-wheel 71, around which passes a band or belt 72, (see Figs. 1, 2, and 8,) the two ends of which are attached, respectively, to a fixed member 73 and a pivoted member 74. The member 74 is pivoted at 75 and normally holds the band or belt taut by means of the spring 76, but slackens the belt by means of the fork 77 on the lever 64 engaging with the pivot 78, engaging in turn the pin 79 of the member 74. In addition to this the gear 59 is provided with one or more holes, preferably three, as 80, into which the stop 81 is adapted to enter when actuated by the cam 82 on the main shaft acting against the roll 83 of the lever 84, pivoted at 85. The stop is moved out of the hole 80 when released by the cam by means of the spring 86.

The operation of the machine is as follows: Upon the rotation of the main shaft the parts are so arranged that during the first third of its revolution the cam or wiper 4 successively closes the heads 3 and 2. The core member is moved down first into the lower die and partly bends the lower strand of wire, the said wire being prevented from being improperly displaced by means of the spring-detent 43 and detent-fingers 48. The upper die then closes the mold, doubling over the wire and bending it over the core, the spring-detent being moved out by the action of this. If a hook is desired, and the movable member 40 employed, this will be operated simultaneously with the closing of the mold. The free ends of the wire are now pinched by the wire-pinching mechanism and the outer ends of the mold clasped by the jaws 16 and 17, so that the heads are now in position to be rotated and the wire twisted. The clutch mechanism connecting the gear 59 to the main shaft is now thrown in and the two heads rotated in unison during the second third of the revolution of the main shaft. When three twists have been imparted to the wire, the clutch is thrown out and the gear 59 stopped. During the third part of the revolution of the main shaft the wiper or cam 5 moves from one head to the other and opens the molds successively, the jaws 16 and 17 releasing the heads and the upper movable die

moving upward while as the core member rises the stripper strips the blank off the machine, the stripper on each head throwing the blank out of the machine. The movable member 40, if such be employed, is now also moved upward by means of the cam 42. The machine is now ready to go through another cycle of movements. Preferably, as stated, these cycles are continuous.

10 What is claimed is—

1. In a machine of the character set forth, two wire-bending dies, having grooves, which, when brought together, form a closed mold, whose interior conforms substantially to the configuration of the blank desired and closely embraces the same, and means for opening and closing the mold.

2. In a machine of the character set forth, two wire-bending dies, having grooves, which, when brought together, form a closed mold, whose interior conforms substantially to the configuration of the blank desired and closely embraces the same, a core member adapted to be moved into and out of position between the dies, and around which the blank is bent, and means for operating the core member and for opening and closing the mold.

3. In a machine of the character set forth, two wire-bending dies, having grooves, which, when brought together, form a closed mold, whose interior conforms substantially to the configuration of the blank desired and closely embraces the same, a core member adapted to be moved into and out of position between the dies, and around which the blank is bent, means for operating the core member and for opening and closing the mold, and means for stripping the blank off the core member.

4. In a machine of the character set forth, two wire-bending dies, having grooves, which, when brought together, form a closed mold, whose interior conforms substantially to the configuration of the blank desired and closely embraces the same, a movable member in one of said dies adapted to assist in shaping the wire, and means for opening and closing the mold.

5. In a machine of the character set forth, two wire-bending dies, having grooves, which, when brought together, form a closed mold, whose interior conforms substantially to the configuration of the blank desired and closely embraces the same, a core member adapted to be moved into and out of position between the dies, and around which the blank is bent, a movable member in one of said dies adapted to assist in shaping the wire, and means for operating the core member and for opening and closing the mold.

6. In a machine of the character set forth, two wire-bending dies, having grooves, which, when brought together, form a closed mold, whose interior conforms substantially to the configuration of the blank desired and closely embraces the same, a core member adapted

to be moved into and out of position between the dies, and around which the blank is bent, a movable member in one of said dies adapted to assist in shaping the wire, means for operating the core member and for opening and closing the mold, and means for stripping the blank off the core member.

7. In a machine of the character set forth, two wire-bending dies, one of which is stationary, and the other of which is movable, having grooves, which, when brought together, form a closed mold, whose interior conforms substantially to the configuration of the blank desired and closely embraces the same, a hinge connecting the two dies, and means for operating the movable die to open and close the mold.

8. In a machine of the character set forth, two wire-bending dies, one of which is stationary, and the other of which is movable, having grooves, which, when brought together, form a closed mold, whose interior conforms substantially to the configuration of the blank desired and closely embraces the same, a hinge connecting the two dies, a core member pivoted at right angles to the hinge connecting the two dies, adapted to be moved into the stationary die before the mold is closed by the movable die, and means for operating the core member and the movable die to open and close the mold.

9. In a machine of the character set forth, two wire-bending dies, one of which is stationary, and the other of which is movable, having grooves, which, when brought together, form a closed mold, whose interior conforms substantially to the configuration of the blank desired and closely embraces the same, a hinge connecting the two dies, a core member pivoted at right angles to the hinge connecting the two dies, adapted to be moved into the stationary die before the mold is closed by the movable die, means for operating the core member and the movable die to open and close the mold, and means for stripping the blank off the core member.

10. In a machine of the character set forth, a stationary and a movable die, a hinge connecting the said dies, a core member pivoted at right angles to the hinge connecting the dies, and means for operating the core and movable die.

11. In a machine of the character set forth, a stationary and a movable die, a hinge connecting the said dies, a core member pivoted at right angles to the hinge connecting the dies, means for operating the movable die, a cam carried by the hinge connecting the dies, and means for operating the core member from the said cam.

12. In a machine of the character set forth, two wire-bending dies adapted to be brought together, a core member adapted to be moved into and out of position between the two dies, and around which the wire is bent, a strip-

ping member surrounding the core member and moving therewith within which it recedes when moved out of position between the dies, and from which it emerges when moved into position between the dies.

13. In a machine of the character set forth, two wire-bending dies adapted to be brought together, a core member pivotally supported and adapted to be moved into and out of position between the two dies, and around which the wire is bent, a stripping member surrounding the said core member, pivoted eccentrically to the pivot of the core member, within which the said core member recedes when moved out of position between the dies, and from which it emerges when moved into position between the dies.

14. In a machine of the character set forth, two wire-bending dies, one of which is stationary, and the other of which is movable, a hinge connecting the said dies, a core member pivoted at right angles to the hinge of the dies, adapted to be moved into and out of position on the stationary die, and around which the wire is bent, a stripping member surrounding the said core member, pivoted eccentrically to the pivot of the said core member, within which the core member recedes when moved out of position from the stationary die, and from which it emerges when moved into position on the stationary die, a cam on the hinge connecting the dies, and means for operating the core member from the said cam.

15. In a machine of the character set forth, two wire-bending dies, having grooves, which, when brought together, form a closed mold, whose interior conforms substantially to the configuration of the blank desired and closely embraces the same, means for opening and closing the mold, means for pinching the free ends of the wire, and means for rotating the mold.

16. In a machine of the character set forth, two wire-bending dies, having grooves, which, when brought together, form a closed mold, whose interior conforms substantially to the configuration of the blank desired and closely embraces the same, a core member adapted to be moved into and out of position between the dies, and around which the blank is bent, means for operating the core member and for opening and closing the mold, means for pinching the free ends of the wire, and means for rotating the mold.

17. In a machine of the character set forth, two wire-bending dies, having grooves, which, when brought together, form a closed mold, whose interior conforms substantially to the configuration of the blank desired and closely embraces the same, a core member adapted to be moved into and out of position between the dies, and around which the blank is bent, means for operating the core member and for opening and closing the mold, means for strip-

ping the blank off the core member, means for pinching the free ends of the wire, and means for rotating the mold.

18. In a machine of the character set forth, two wire-bending dies, having grooves, which, when brought together, form a closed mold, whose interior conforms substantially to the configuration of the blank desired and closely embraces the same, a movable member in one of said dies adapted to assist in shaping the wire, means for opening and closing the mold, means for pinching the free ends of the wire, and means for rotating the mold.

19. In a machine of the character set forth, two wire-bending dies, having grooves, which, when brought together, form a closed mold, whose interior conforms substantially to the configuration of the blank desired and closely embraces the same, a core member adapted to be moved into and out of position between the dies, and around which the blank is bent, a movable member in one of said dies adapted to assist in shaping the wire, means for operating the core member and for opening and closing the mold, means for pinching the free ends of the wire, and means for rotating the mold.

20. In a machine of the character set forth, two wire-bending dies, having grooves, which, when brought together, form a closed mold, whose interior conforms substantially to the configuration of the blank desired and closely embraces the same, a core member adapted to be moved into and out of position between the dies, and around which the blank is bent, a movable member in one of said dies adapted to assist in shaping the wire, means for operating the core member and for opening and closing the mold, means for stripping the blank off the core member, means for pinching the free ends of the wire, and means for rotating the mold.

21. In a machine of the character set forth, two wire-bending dies, one of which is stationary, and the other of which is movable, having grooves, which, when brought together, form a closed mold, whose interior conforms substantially to the configuration of the blank desired and closely embraces the same, a hinge connecting the two dies, means for operating the movable die to open and close the mold, means for pinching the free ends of the wire, and means for rotating the mold.

22. In a machine of the character set forth, two wire-bending dies, one of which is stationary, and the other of which is movable, having grooves, which, when brought together, form a closed mold, whose interior conforms substantially to the configuration of the blank desired and closely embraces the same, a hinge connecting the two dies, a core member pivoted at right angles to the hinge connecting the two dies, adapted to be moved into the stationary die before the mold is

closed by the movable die, means for operating the core member and the movable die to open and close the mold, means for pinching the free ends of the wire, and means for rotating the mold.

23. In a machine of the character set forth, two wire-bending dies, one of which is stationary, and the other of which is movable, having grooves, which, when brought together, form a closed mold, whose interior conforms substantially to the configuration of the blank desired and closely embraces the same, a hinge connecting the two dies, a core member pivoted at right angles to the hinge connecting the two dies, adapted to be moved into the stationary die before the mold is closed by the movable die, means for operating the core member and the movable die to open and close the mold, means for stripping the blank off the core member, means for pinching the free ends of the wire, and means for rotating the mold.

24. In a machine of the character set forth, a stationary and a movable die connected by a hinge at one end, gear-teeth on the said hinge, a reciprocating rack meshing with said gear-teeth, a core member pivoted at right angles to the hinge connecting the dies adapted to be moved into and out of position on the stationary die, means whereby the movement of the hinge is imparted to the core member, and means for causing the rack to reciprocate.

25. In a machine of the character set forth, a stationary and a movable die connected by a hinge at one end, gear-teeth on the said hinge, a reciprocating rack meshing with said gear-teeth, a core member pivoted at right angles to the hinge connecting the dies adapted to be moved into and out of position on the stationary die, a cam moving with the hinge, a friction-roll carried by the core whereby the movement of the hinge moves the core into position between the dies, and means for causing the rack to reciprocate.

26. In a machine of the character set forth, a stationary and a movable die connected by a hinge at one end, gear-teeth on the said hinge, a reciprocating rack meshing with said gear-teeth, a core member pivoted at right angles to the hinge connecting the dies adapted to be moved into and out of position on the stationary die, a stripper surrounding the said core member, means whereby the movement of the hinge is imparted to the core member and to the stripper, and means for causing the rack to reciprocate.

27. In a machine of the character set forth, a stationary and a movable die connected by a hinge at one end, gear-teeth on the said hinge, a reciprocating rack meshing with said gear-teeth, a core member pivoted at right angles to the hinge connecting the dies, a cam moving with the hinge, and a friction-roll carried by the core member, a stripper sur-

rounding the core member and mounted on an eccentric whereby the movement of the hinge causes the core member to be moved into position between the dies and to free itself from the stripper and vice versa upon the return movement, and means for causing the rack to reciprocate.

28. In a machine of the character set forth, a stationary and a movable die connected by a hinge at one end, gear-teeth on the said hinge, a reciprocating rack meshing with the said gear-teeth, a core member pivoted at right angles to the hinge connecting the dies adapted to be moved into and out of position on the stationary die, means whereby the movement of the hinge is imparted to the core member, means for causing the rack to reciprocate and a movable member in the lower die for bending the wire inwardly and forwardly adapted to be operated when the dies are brought together.

29. In a machine of the character set forth, a stationary and a movable die connected by a hinge at one end, gear-teeth on the said hinge, a reciprocating rack meshing with said gear-teeth, a core member pivoted at right angles to the hinge connecting the dies adapted to be moved into and out of position on the stationary die, means whereby the movement of the hinge is imparted to the core member, means for causing the rack to reciprocate, a spring-detent normally in position over the stationary die adapted to prevent the wire from flying upward when the core member moves in over the lower die and adapted to be moved out of the way when the dies are brought together.

30. In a machine of the character set forth, a stationary and a movable die connected by a hinge at one end, gear-teeth on the said hinge, a reciprocating rack meshing with said gear-teeth, a core member pivoted at right angles to the hinge connecting the dies adapted to be moved into and out of position on the stationary die, means whereby the movement of the hinge is imparted to the core member, means for causing the rack to reciprocate, and means for preventing the wire from jumping out of the die.

31. In a machine of the character set forth, a head mounted in bearings at one end, a mold carried by said head composed of two dies whose outer ends are in the shape of a shaft or stud when closed, jaws for clamping said stud formed by the outer ends of the two dies of the mold, and means for rotating the head.

32. In a machine of the character set forth, the combination with a main shaft, of a head, wire-bending members on the said head, means for causing the said wire-bending members to act on the wire during the first third of the revolution of the main shaft, means for rotating the said head during the second third of the revolution of the said main shaft,

and means for disengaging the wire-bending members during the third revolution of the said main shaft.

33. In a machine of the character set forth, 5 the combination with a main shaft, of two heads, wire-bending members on each head, means for causing the said wire-bending members to act on the wire to bend the same during the first third of the revolution of the 10 main shaft, means for rotating the said heads in unison during the second part of the revolution of the main shaft, and means for disengaging the said wire-bending members during the third part of the revolution of the 15 main shaft.

34. In a machine of the character set forth, the combination with a main shaft, of two heads, a mold on each of said heads for bending the wire, means for closing the said mold 20 during the first part of the revolution of the main shaft, means for rotating the two heads during the second part of the revolution of the main shaft, and means for opening the said molds during the third part of the revolution of the main shaft. 25

35. In a machine of the character set forth, the combination of a main shaft, two heads, wire-bending members on each of said heads,

means located on the main shaft for closing the said wire-bending members to act and to 30 disengage themselves from each other, transmission mechanism on the main shaft for driving the said heads periodically from the main shaft, wire-pinching mechanism adapted to be operated at periods corresponding to 35 the rotating of the heads, a brake for retarding the motion of the transmission mechanism on the main shaft, and means for stopping the motion thereof.

36. In a machine of the character set forth, 40 the combination with a head, a mold carried by the said head composed of two dies, whose outer ends when closed are shaped in the form of a shaft, two pivoted jaws adapted to grasp the outer ends of the said dies, wire-pinching 45 mechanism carried by the said jaws, toggles controlling the said jaws, and means for closing and opening the said jaws.

Signed at New York this 10th day of March, 1905.

ARCHIBALD KENT.
ROBERT ORR.

Witnesses:

FRED. BEEKER,
HENRY BEST.