No. 850,993. PATENTED APR. 23, 1907.

J. H. BROWN.

WIRE WINDING APPARATUS.

APPLICATION FILED JULY 2, 1906.

5 SHEETS—SHEET 1.

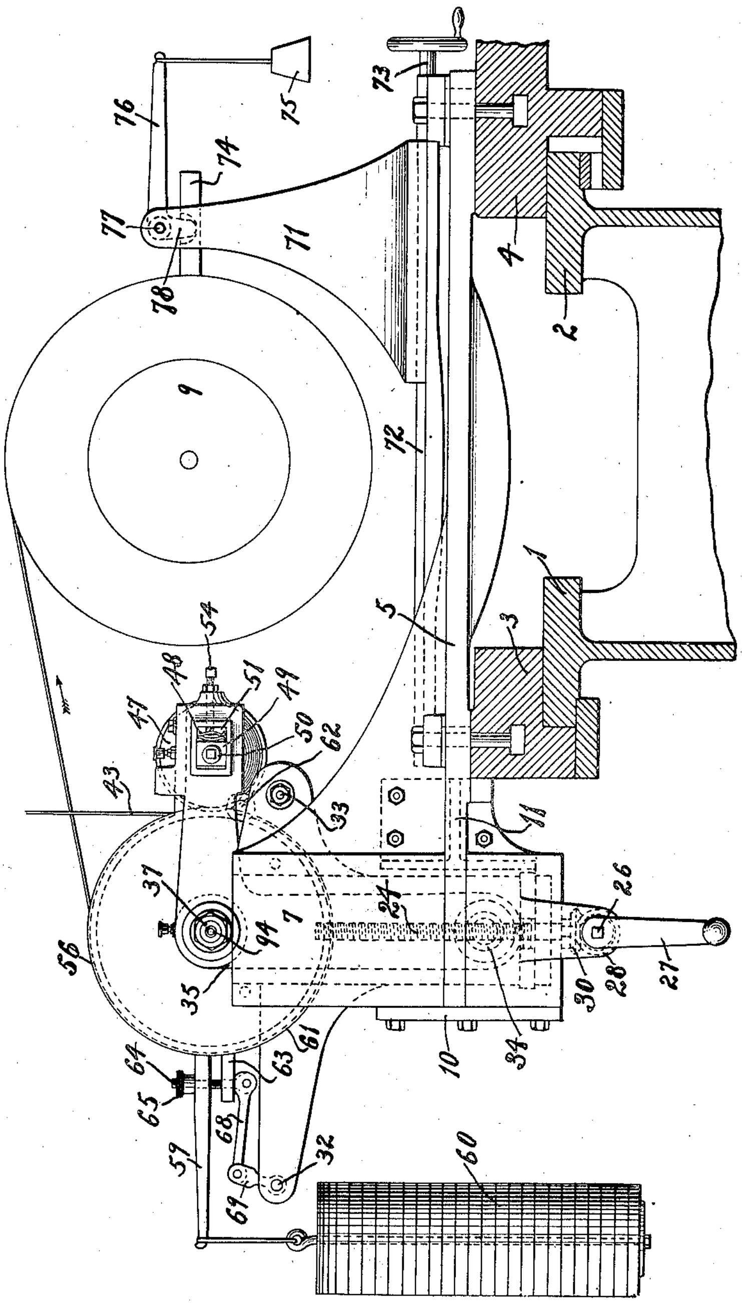


Fig. 1.

Witnesses:

F. G. Hachenburg.

Henry Thieme

Inventor:

John H. Brown

By his Attorneys

Brown & Seward

No. 850,993.

PATENTED APR. 23, 1907.

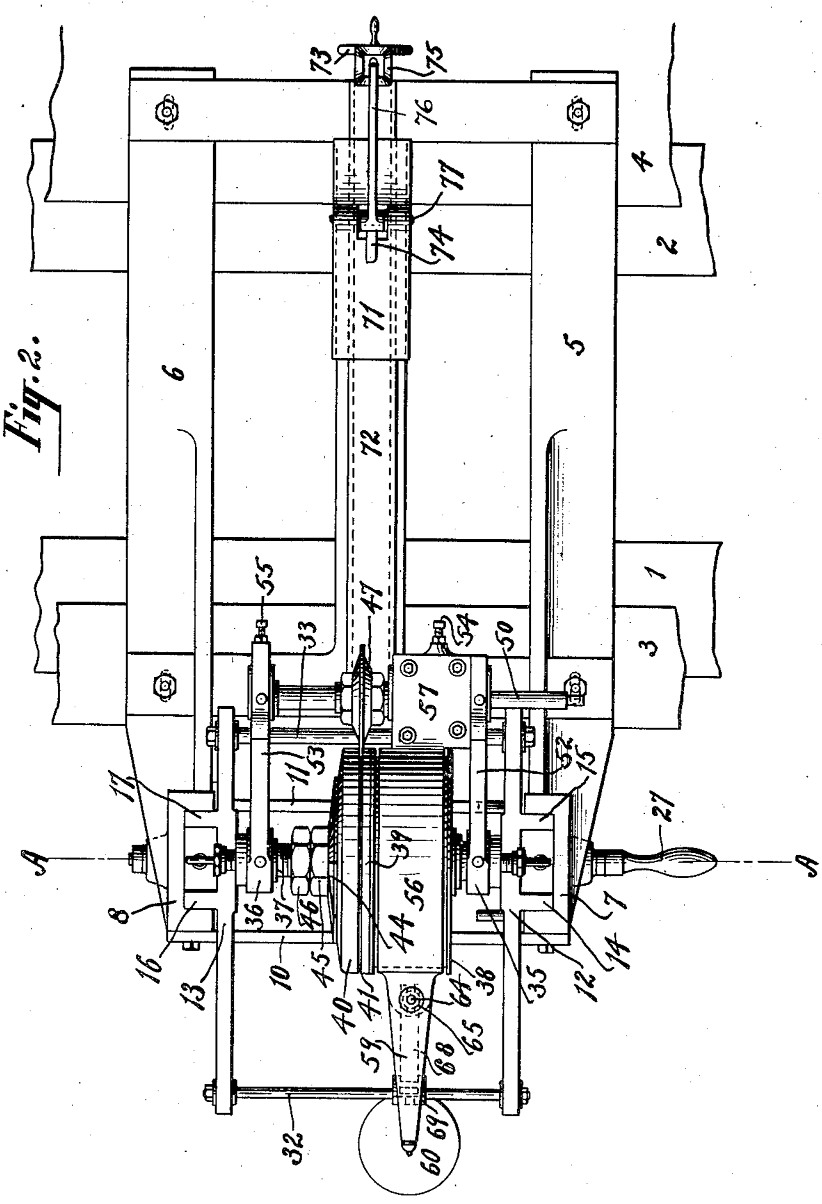
J. H. BROWN.

WIRE WINDING APPARATUS.

APPLICATION FILED JULY 2, 1906.

5 SHEETS—SHEET 2.

Fig. 2.



Witnesses:
F. G. Hackenberg.
Henry Thieme

Inventor:
John H. Brown
By his Attorneys
Brown & Seward

No. 850,993.

PATENTED APR. 23, 1907.

J. H. BROWN.

WIRE WINDING APPARATUS.

APPLICATION FILED JULY 2, 1906.

5 SHEETS—SHEET 3.

Fig. 5.

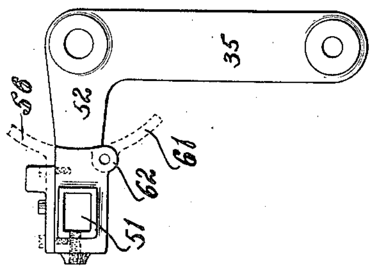
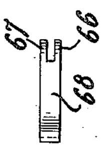


Fig. 6.



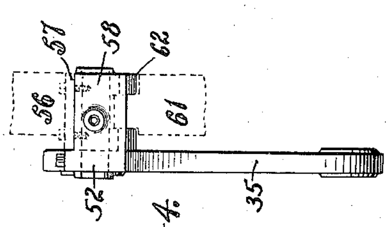


Fig. 4.

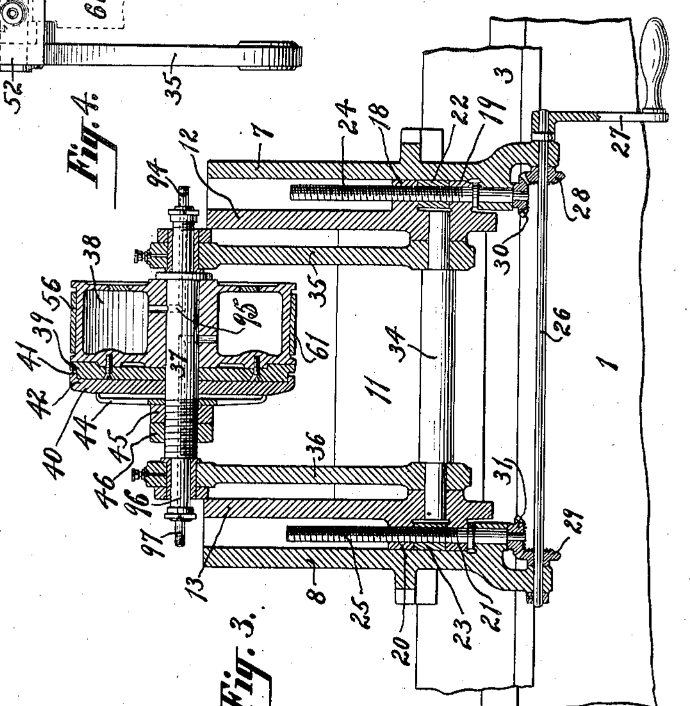


Fig. 3.

Witnesses:

F. G. Hachenberg.

J. Henry Thieme

Inventor:

John H. Brown

By his Attorneys

Brown & Seward

No. 850,993.

PATENTED APR. 23, 1907.

J. H. BROWN.

WIRE WINDING APPARATUS.

APPLICATION FILED JULY 2, 1906.

5 SHEETS—SHEET 4.

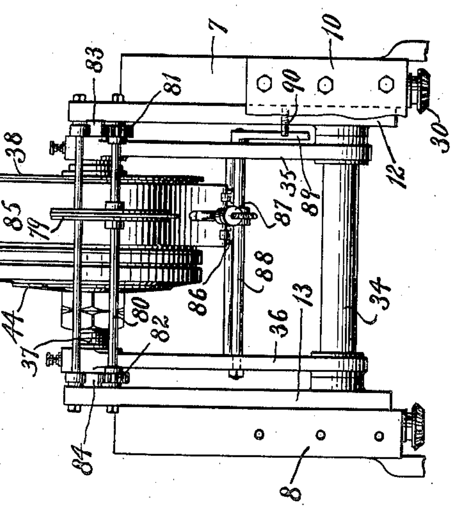


Fig. 8.

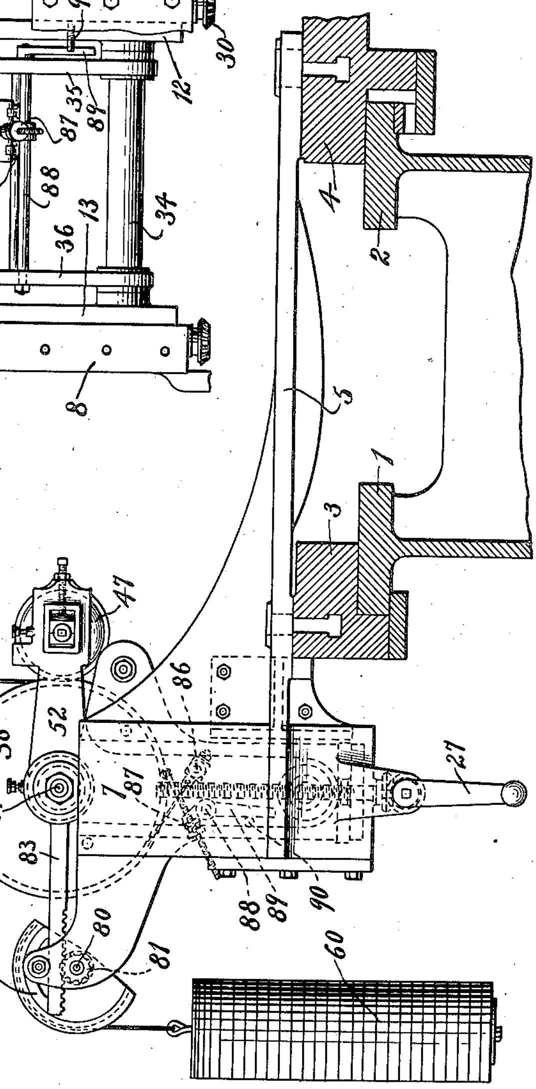


Fig. 7.

Witnesses:

F. G. Hachenberg.

Henry Thieme.

Inventor:

John H. Brown

By his Attorneys

Brown & Seward

No. 850,993. PATENTED APR. 23, 1907.

J. H. BROWN.

WIRE WINDING APPARATUS.

APPLICATION FILED JULY 2, 1906.

5 SHEETS—SHEET 5.

Fig. 10.

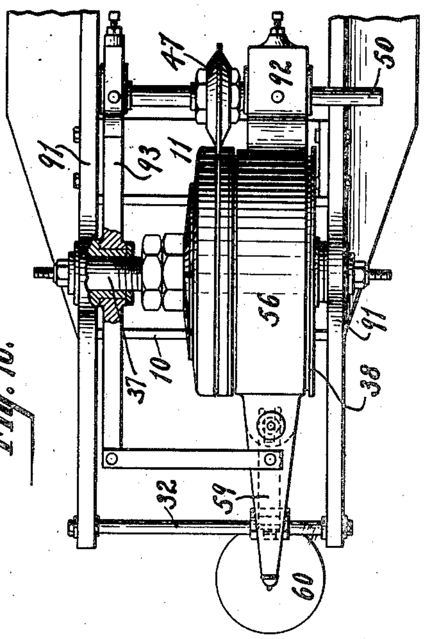
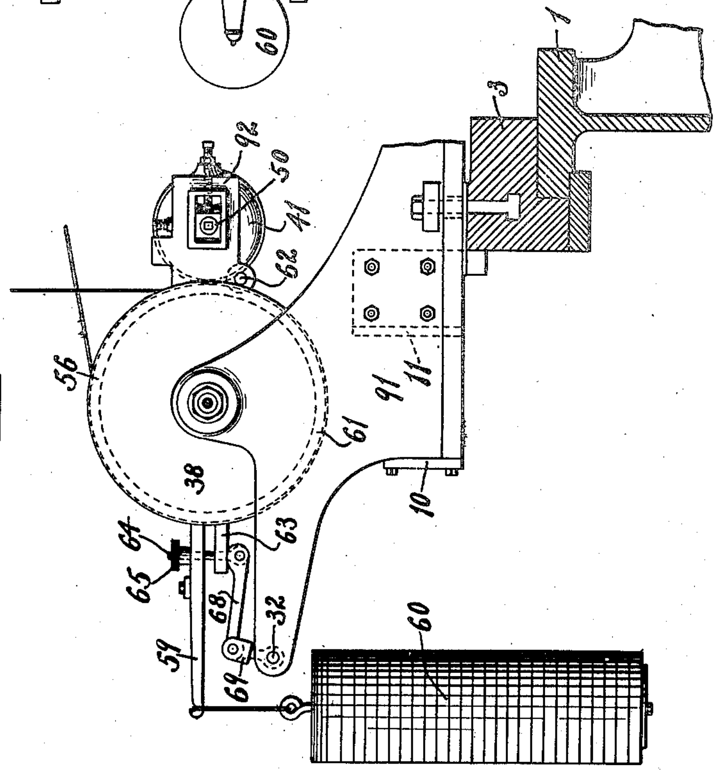


Fig. 9.



Witnesses:

F. G. Hachenberg.

Henry Thieme

Inventor:

John H. Brown

By his attorneys

Brown & Seward

UNITED STATES PATENT OFFICE.

JOHN H. BROWN, OF JERSEY CITY, NEW JERSEY.

WIRE-WINDING APPARATUS.

No. 850,993. Specification of Letters Patent. Patented April 23, 1907.

Application filed July 2, 1906. Serial No. 324,359.

To all whom it may concern:

Be it known that I, JOHN H. BROWN, a citizen of the United States, and a resident of Jersey City, in the county of Hudson and State of New Jersey, have invented a new and useful Wire-Winding Apparatus, of which the following is a specification.

My invention relates to wire-winding apparatus, and more particularly to apparatus for holding wire under tension while being applied to a rotating body.

The object is to provide effective means for automatically maintaining a uniform tension and for utilizing the wound wire to feed the tension mechanism along the body being wound.

In the accompanying drawings, Figure 1 is a view of the apparatus in side elevation, the track along which it moves being shown in transverse vertical section. Fig. 2 is a top plan view. Fig. 3 is a transverse vertical section of the apparatus in the plane of the line A A of Fig. 2. Fig. 4 is a view in detail, in rear elevation, of the rocking arm to which the brake is attached. Fig. 5 is a view of the same in side elevation looking from the inside of the apparatus outwardly. Fig. 6 is a top plan view in detail of one of the toggle-lever links. Fig. 7 is a view in side elevation of a modified form of the apparatus. Fig. 8 is a front view with weight removed, showing the means for regulating the tension on the brake. Fig. 9 is a view in partial side elevation of a second modification; and Fig. 10 is a top plan view of the same, partly in section.

The apparatus is supported on a track including the rails or ways 1 and 2. On these rails the bearing-pieces 3 and 4 slide and are connected by cross plates or beams 5 and 6, provided at one end with upright hollow-faced standards 7 and 8, in which the tension mechanism is mounted.

The track, with its rails 1 and 2, is commonly the bed of a lathe in which the body to be wound is held—in the present instance a gun-body (indicated at 9)—it being assumed that means of well-known or approved form may be employed to rotate the body 9 to wind the wire thereon.

The outer ends of the beams 5 and 6 are connected by braces 10 and 11, and in the hollow faces of the standards 7 and 8 the opposite ends 12 and 13 of a vertically-adjustable frame are fitted to slide. The said ends 12 and 13 are each provided with outwardly-extending flanges, the end 12 with the flanges 14 15 and the end 13 with the flanges 16 17, which flanges engage the end walls of the hollow-faced standards. The ends 12 and 13 are, further, each provided with lugs, the end 12 with lugs 18 19 and the end 13 with lugs 20 21, located between their outwardly-extending flanges and spaced apart to admit between them traveling nuts 22 23.

Vertical screws 24 25 are seated in the lower portions of the standards 7 and 8 and passing upwardly through the lugs 18 19 and 20 21, respectively, are engaged with the traveling nuts 22 23 and serve when simultaneously operated in the one direction or the other to raise and lower the ends 12 and 13 and the parts carried thereby.

The screws 24 25 may be simultaneously operated by a shaft 26, turned by a crank 27 and provided with bevel gear-wheels 28 29, meshing with bevel gear-wheels 30 31 on the screws 24 25.

The upper portions of the ends 12 13 are extended to the front and rear, and connected by braces 32 and 33. A shaft 34 is mounted in the lower portions of the ends 12 and 13, and on it the rocking arms 35 and 36 are supported at their lower ends so as to rock toward and away from the body 9 to be wound.

In the upper end of the arms 35 and 36 there is journaled a shaft 37, which carries a brake-wheel 38, a disk 39, made fast to the brake-wheel, and a disk 40, free to move bodily to a limited extent toward and away from the disk 39. The disk 39 has a rabbet 41 at one edge of its periphery, and the disk 40 has an annular lip 42 adapted to overlap the shoulder of the rabbet 41 when the disk 40 is pressed toward the disk 39.

The depth of the rabbet 41 is intended to be equal to or somewhat greater than the thickness of the wire 43, and, when in operation, the wire is passed around the disk 39 between the radial wall of the rabbet 41 and the face of the lip 42 on the disk 40 and has pressure applied to it to prevent it from slipping by a concave split spring-plate 44, the rim of which engages the back of the disk 40 and the crown of which is engaged by a nut 45, screwed on the shaft 37, and held in position by a lock-nut 46.

The drum 38 is kept cool by means of circulating a cooling medium through it—in the present instance by means of an inlet-pipe 94, connecting with a passage 95 in the shaft

37, communicating with the interior of the drum, and a passage 96 in the shaft 37, connecting with an outlet-pipe 97.

The wire 43 is forced into position between the disks 39 and 40 as it comes from the reel or other supply (not shown) by means of a guide-wheel 47, the periphery of which is opposite the rabbet 41, the said wheel 47 being yieldingly held with its periphery close to the rabbet 41 and pressing against the wire fed between it and the rabbet by springs 48, the tension of which is exerted to force the sliding bearings 49, and hence the shaft 50 and wheel 47, toward the disks 39 and 40.

The sliding bearings 49 are mounted in elongated slots 51 in rearwardly-extending portions 52 53 of the rocking arms 35 and 36, and the said bearings are adjusted to force the wheel 47 toward the disks 39 and 40 by means of set-screws 54 and 55, it being understood that the portion 53 of the arm 36 has a slot, sliding bearing, and spring corresponding to the slot 51, sliding bearing 49, and spring 48, shown in connection with the portion 52 of the arm 35 in Fig. 1.

Tension is applied to the brake wheel or drum 38, and hence to the disks which grip the wire, as follows: One section of the brake-band—in the present instance a metallic band—has a body portion 56, which rests on and is curved to conform to the periphery of the brake wheel or drum 38, its rear end terminating in a plate 57, which is bolted to an inward extension 58 of the part 52 of the arm 35, (see Figs. 4 and 5,) and its opposite end extending forwardly in the form of an arm 59, from which the series of weights 60 is suspended. The other section 61 of the brake-band is hinged at one end to the under side of the extension 58, as at 62 and after following the curved periphery of the drum 38 underneath terminates in a forwardly-projecting arm 63. The arm 63 is drawn toward the arm 59 to increase the tension on the drum 38 by a bolt 64, extending upwardly through the said arms and provided on its upper end with an adjusting-nut 65.

The head of the bolt 64 is pivoted between the branches 66 and 67 of a link 68, which in turn is connected by a link 69 with the brace 32 on the end frame 12. The upper faces of the branches 66 and 67 of the link 68 bear against the under side of the arm 63 and are so curved as to form, in effect, a cam which as the link 68 is rocked downwardly, tending to straighten the toggle-joint formed by the two links 68 and 69, will interpose gradually less and less thickness between the pivot of the bolt-head and the arm 63, thereby permitting the said arm 63 to gradually separate from the arm 59, and hence reduce the friction on the drum 38. The reverse movement of the link 68 will tend to close the arm 63 toward the arm 59 and increase the friction on the drum 38.

The beams 5 and 6, with the bearing-pieces 3 and 4, constituting the carriage, are moved bodily along the rails 1 and 2 by the pressure of the wound layer of wire, as follows: A support 71, after the manner of a tool-support common to lathes, is mounted on a dovetail way 72 and arranged to be adjusted toward and away from the axis of the body being wound by an adjusting-screw 73.

A dog 74 is mounted in the upper part of the support 71 and has a sliding movement toward and away from the body 9. The dog 74 is held with its forward end against the core-tube or previously-wound layer of wire by a weight 75, suspended from an arm 76 of an angle-lever fulcrumed at 77 in the support 71, its short arm 78 having an engagement with the dog 74. As the body 9 rotates the layer of wire being wound will press against the side of the dog 74 and will gradually move it and the parts which support it bodily along lengthwise of the body 9, and this movement will precisely accord with the length of the layer being wound, while the pressure required to force the apparatus along will tend to crowd the strands laterally into close contact.

In operation, the body to be wound having been placed in position in the lathe and the tension device adjusted vertically by means of the crank 27 to the desired position and the end of the wire 43 made fast to the body 9, the rotary movement of the body 9 will draw the wire from the disks 39 and 40, causing them to rotate under the friction produced by the weights 60 and the bolt 64. The intention is to make the weights 60 supply nearly, but not quite, the desired amount of friction to give the wire the necessary tension and to supplement this friction by adjusting the nut 65 on the bolt 64 so that the tension shall be normal when the parts are drawn forwardly in the position shown in Fig. 1, with the rocking arms 35 and 36 substantially upright and intermediate of the limits of their forward and backward movements and with the friction produced by the band-section 61 partly, but not wholly, removed. If now because of a slight variation in the feeding of the wire to the gripping-disks 39 and 40 they are drawn bodily toward or permitted to move bodily away from the body 9, the cam-link 68 will promptly, in the one instance, relieve the friction in the manner hereinabove described and permit the arms 35 and 36 to swing back into their normal position and, in the other instance, will increase the friction and cause the arms to be drawn forward into their normal position, thus keeping the tension at all times uniform throughout the winding of the layer or layers. This tension may be made any predetermined amount within the limits of the apparatus by manipulating the pressure on the disk 40 and the weights 60, and the wire will not be distorted by the gripping-disks. When a layer has been wound, the feed-dog support 71 may be adjusted to the new layer by the screw 73 and the winding proceed as before.

Instead of applying the weights 60 directly to the brake-band, as hereinbefore described, they may be applied to a rocking segment 79, fixed on a shaft 80, mounted in the vertically-adjustable frame and provided with pinions 81 82, which mesh with rack-bars 83 84, connected with the shaft 37, which carries the brake wheel or drum and gripping-disks. The brake band 85 is in this instance carried around the brake wheel or drum, one end being made fast to a suitable support 86 on the rocking arm 35 and the other end connected to the short arm 87 of a lever pivoted by a rod 88 to the arms 35 36, the long arm 89 of the lever being extended downwardly into position to engage a pin 90, set in the end frame 12, so that when the drum 38 and disks 39 and 40 are drawn toward the body 9 against the weights 60 the arm 89 of the brake-lever will be drawn away from the pin 90 and the brake-band will be loosened, but when the said gripping-disks are permitted to move away from the body 9 the arm 89 of the brake-lever will press against the pin 90 and increase the frictional grip of the brake-band.

Instead of rocking the brake-band and wire-gripping disks bodily on a support they may be mounted in a fixed frame 91, as shown in Figs. 9 and 10, where the abnormal tension will tend to rotate the drum and lift the weight, thereby straightening the toggle-joint 68 69 and releasing the frictional grip in the same manner as when the drum is rocked bodily toward the body 9. In this form the rear end 92 of the brake-band serves as a support for one of the sliding bearings of the guide-wheel shaft, while the other bearing is mounted in an arm 93, fixed to and extending rearwardly from the brake-drum shaft, so that the guide-wheel will rock bodily with the brake-drum and the wire-gripping disks.

In all the forms shown the wire-gripping disks are held bodily in equilibrium between the weight and the body being wound, and the motion of the gripping-disks either rotatively or bodily toward or away from the body being wound regulates the amount of friction to restore the said gripping-disks to their normal position.

It is obvious that other changes might be resorted to without departing from the spirit and scope of my invention. Hence I do not wish to limit myself strictly to the structures herein shown and described; but

What I claim is—

1. In wire-winding apparatus, a rotary wire-gripping device subject to be rotated in one direction by the wire being wound and movable longitudinally along the body being wound, a weight connected with the gripping device, and means for holding the gripping device in equilibrium between the weight and body being wound.

2. In wire-winding apparatus, a rotary wire-gripping device from which the wire passes to the body being wound and movable longitudinally along the body being wound, a weight connected with the wire-gripping device, and friction-regulating mechanism under the control of the movable gripping device for maintaining the gripping device in equilibrium.

3. In wire-winding apparatus, a wire-gripping device movable toward and away from the body being wound and movable longitudinally along the body being wound, and from which the wire passes to the body being wound, a weight connected with the gripping device, and means for holding the gripping device in equilibrium between the weight and body being wound.

4. In wire-winding apparatus, a wire-gripping device movable bodily along lengthwise of the body being wound, means for transmitting the wire under tension from the gripping device to the body being wound, and a feed device connected with the bodily-movable gripping device and subject to the pressure of wire being wound to force the gripping device longitudinally along the body being wound.

5. In wire-winding apparatus, a wire-gripping device movable bodily along lengthwise of the body being wound, means for transmitting the wire under tension from the gripping device to the body being wound, a yielding feed device under the control of the wire being wound, and means for holding the yielding feed device pressed against the body being wound.

6. In wire-winding apparatus, a wire-gripping device, a rocking support therefor, a vertically-adjustable frame for the rocking support, a weight, and means for holding the wire-gripping device in equilibrium between the weight and the body being wound.

7. In wire-winding apparatus, a wire-gripping device consisting of rotary disks between which the wire is passed, and means controlled by said rotary disks for automatically applying friction to regulate the rotation of the disks.

8. In wire-winding apparatus, a wire-gripping device consisting of rotary disks between which the wire passes, one of said disks having a yielding movement toward and away from the other, and means controlled by said rotary disks for automatically applying friction to regulate the rotation of the disks.

9. In wire-winding apparatus, a wire-gripping device consisting of a disk having a rabbet in its periphery and a disk having an annular lip fitted to overlap the shoulder of said rabbet, and means for automatically ap-

plying friction to regulate the rotation of the disks.

10. In wire-winding apparatus, a wire-gripping device consisting of disks between which the wire passes, a brake wheel or drum fixed to rotate with the disks, a brake-band engaged with the wheel or drum, and means for automatically loosening and tightening the brake-band to regulate the rotation of the disks.

11. In wire-winding apparatus, the combination with gripping-disks between which the wire passes, of a guide for forcing the wire between the disks, and means under the control of the disks for regulating the rotation of the disks.

12. In wire-winding apparatus, the combination with gripping-disks between which the wire passes, of a guide-wheel held in yielding adjustment for forcing the wire between the disks, and means for regulating the rotation of the disks.

13. In wire-winding apparatus, the combination with a rotary wire-gripping device, of a brake wheel or drum fixed to rotate with the gripping device, a brake-band and a weight connected directly with the brake-band for applying tension to the wire, and means for holding the gripping device in equilibrium.

14. In wire-winding apparatus, a movable gripping device, a friction wheel or drum, a brake-band resting thereon, a weight suspended from one end of the band, and means for increasing or diminishing the friction on the wheel or drum as the gripping device moves.

15. In wire-winding apparatus, a rotary wire-gripping device, a brake-drum mounted to rotate together with the gripping device, a brake-band resting on the drum, a weight suspended from the brake-band for applying a constant frictional resistance, means for applying additional friction to the drum, and means for automatically varying the amount of said additional friction.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 29th day of June, 1906.

JOHN H. BROWN.

Witnesses:
FREDK. HAYNES,
C. S. SUNDGREN.