

No. 805,265.

PATENTED NOV. 21, 1905.

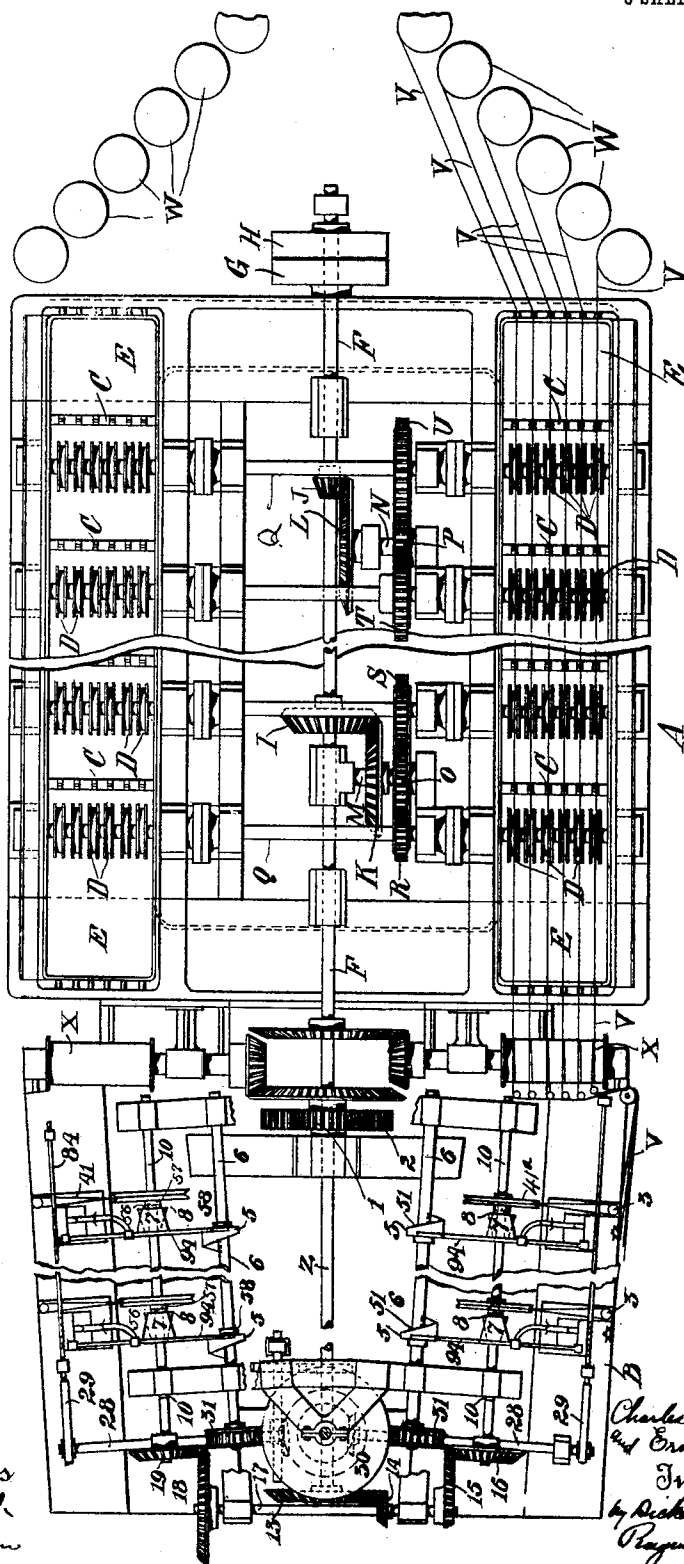
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SPOOLING MACHINE.

APPLICATION FILED APR. 1, 1903.

8 SHEETS—SHEET 1.

Fig. 1.



Witnesses
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8 SHEETS—SHEET 2.

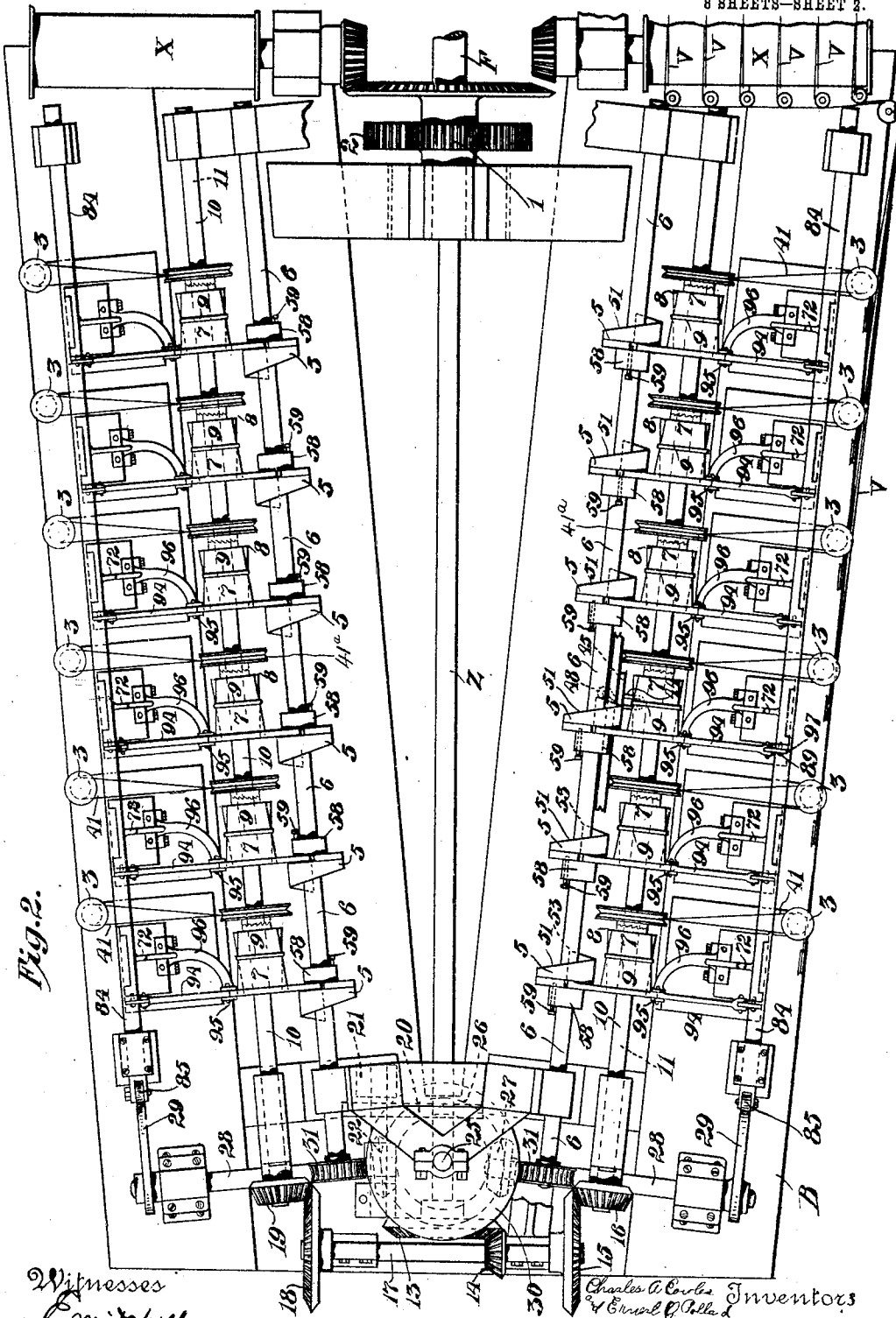


Fig. 2.

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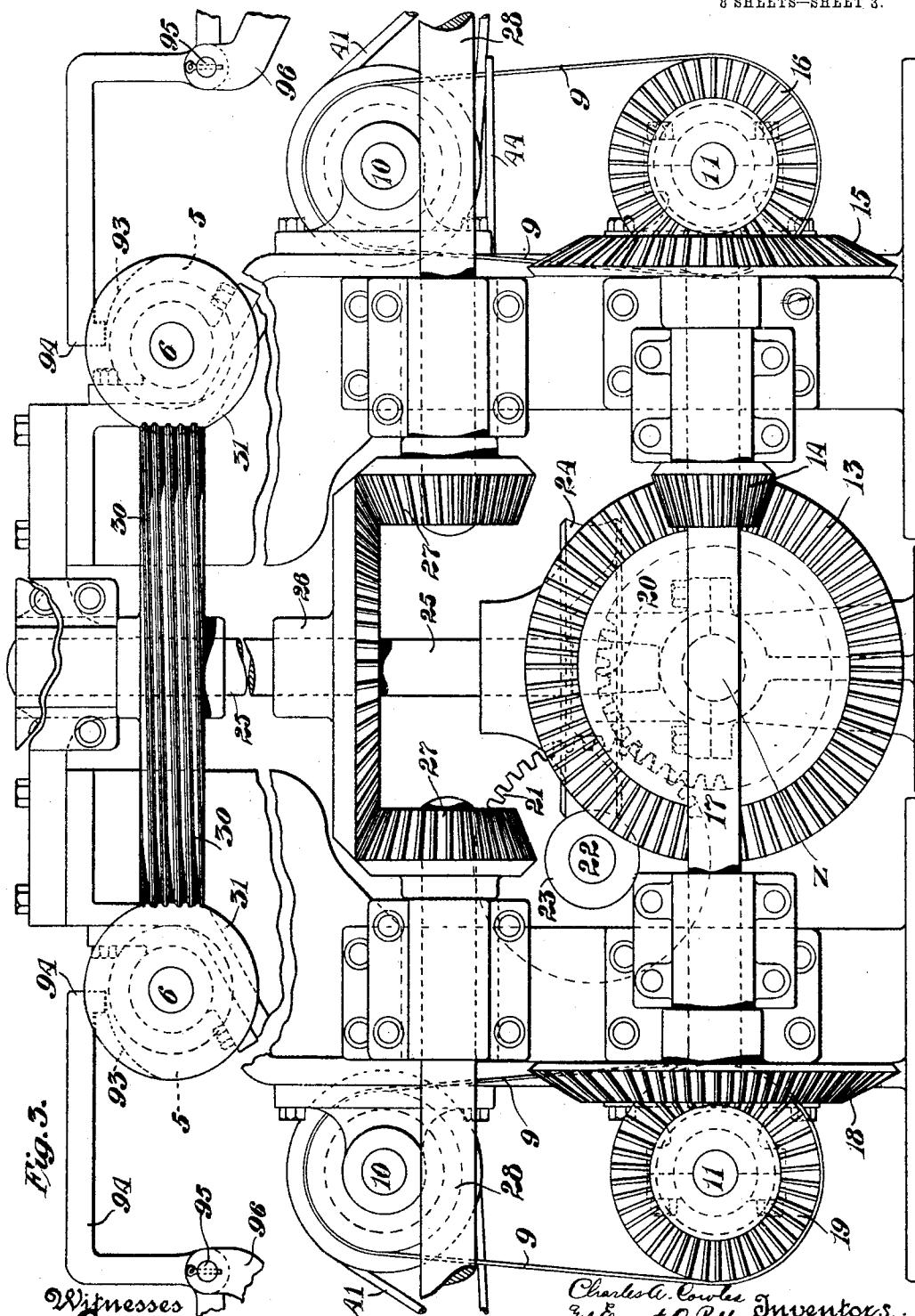


Fig. 3.

Witnesses
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by Dickerson, Brown, Rayner
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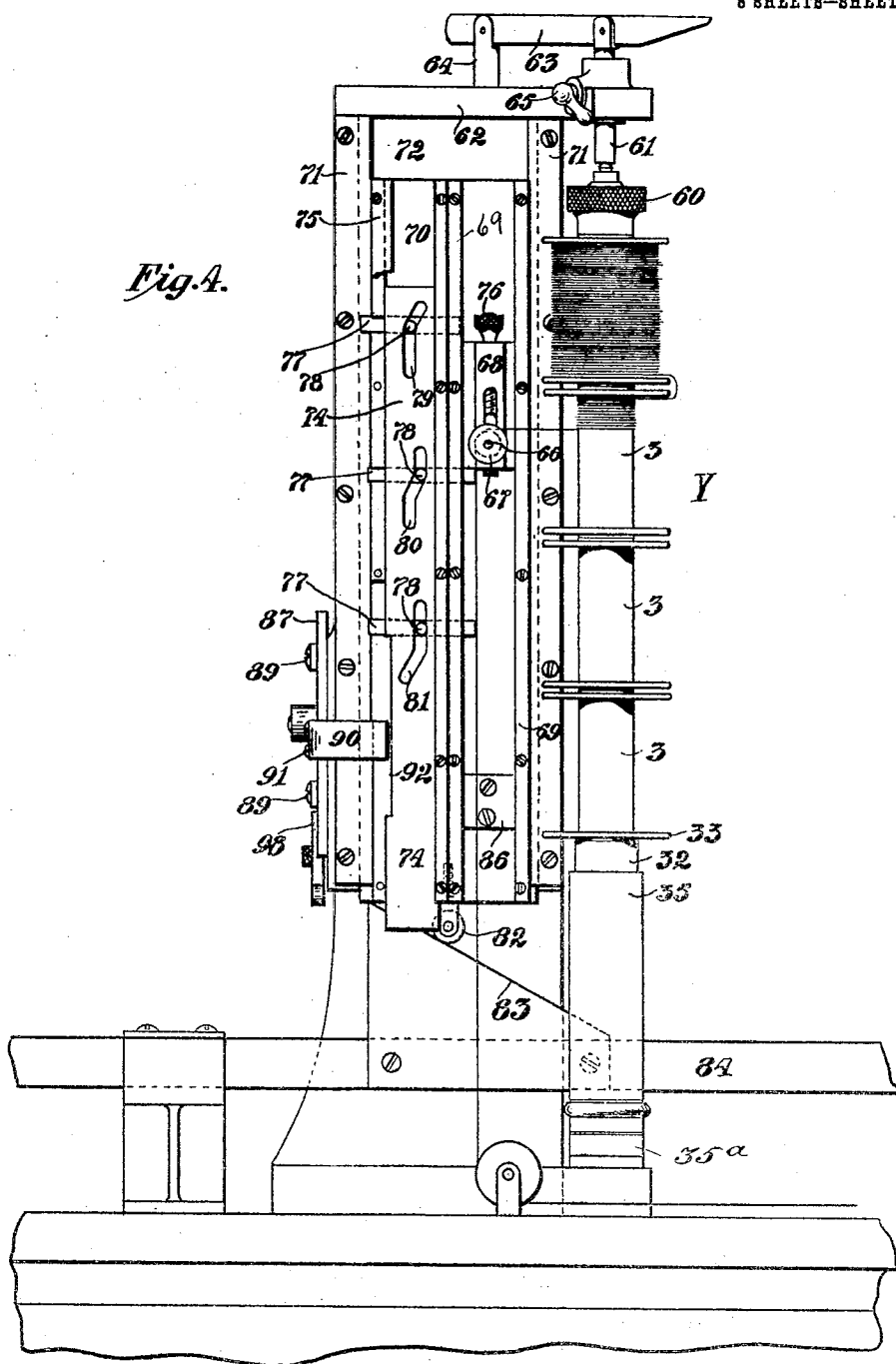
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SPOOLING MACHINE.

APPLICATION FILED APR. 1, 1903.

8 SHEETS—SHEET 4.

Fig. 4.



Witnesses
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8 SHEETS—SHEET 5.

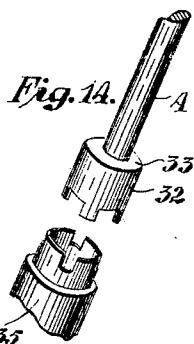
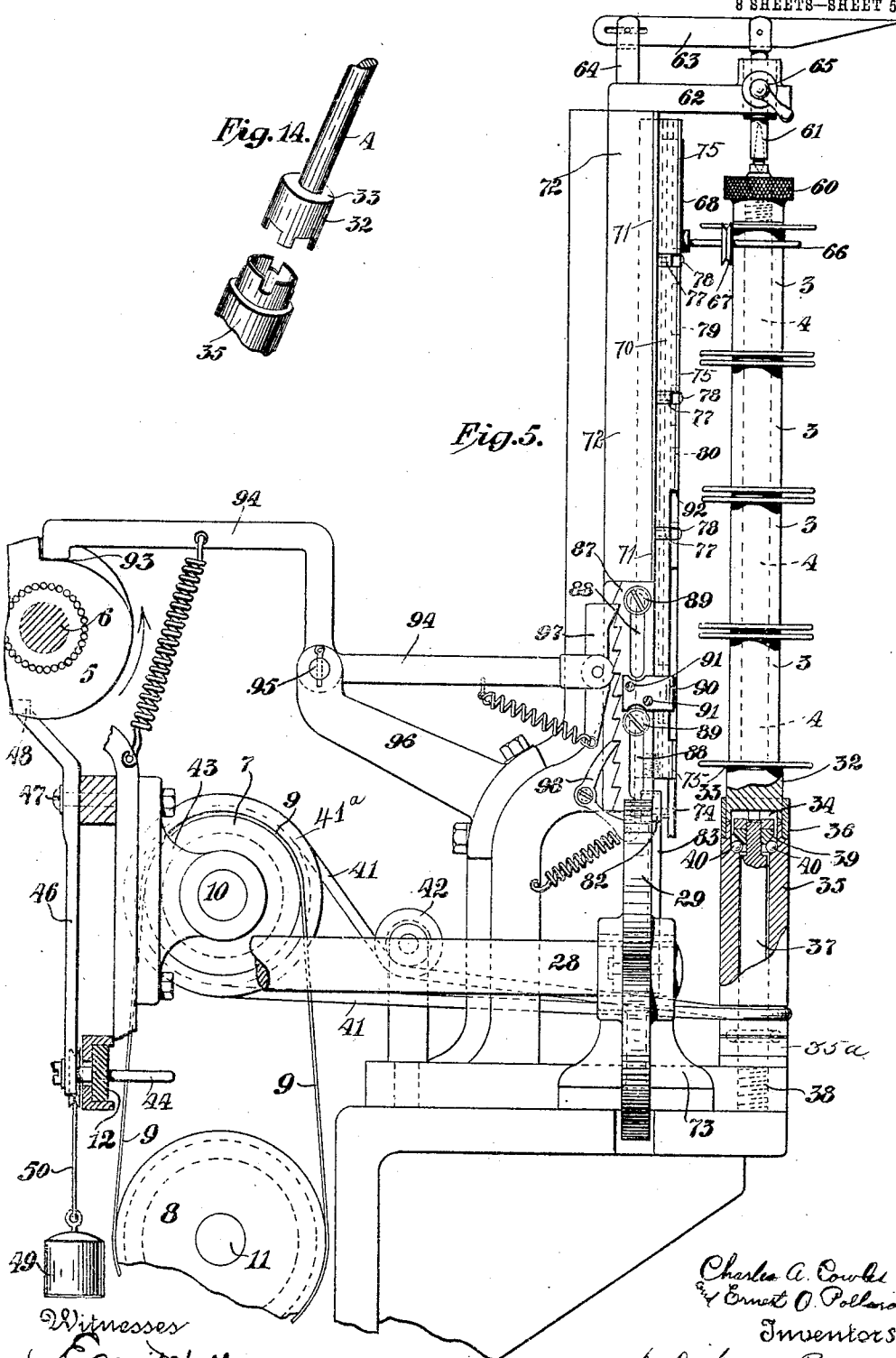


Fig. 5.



Witnesses
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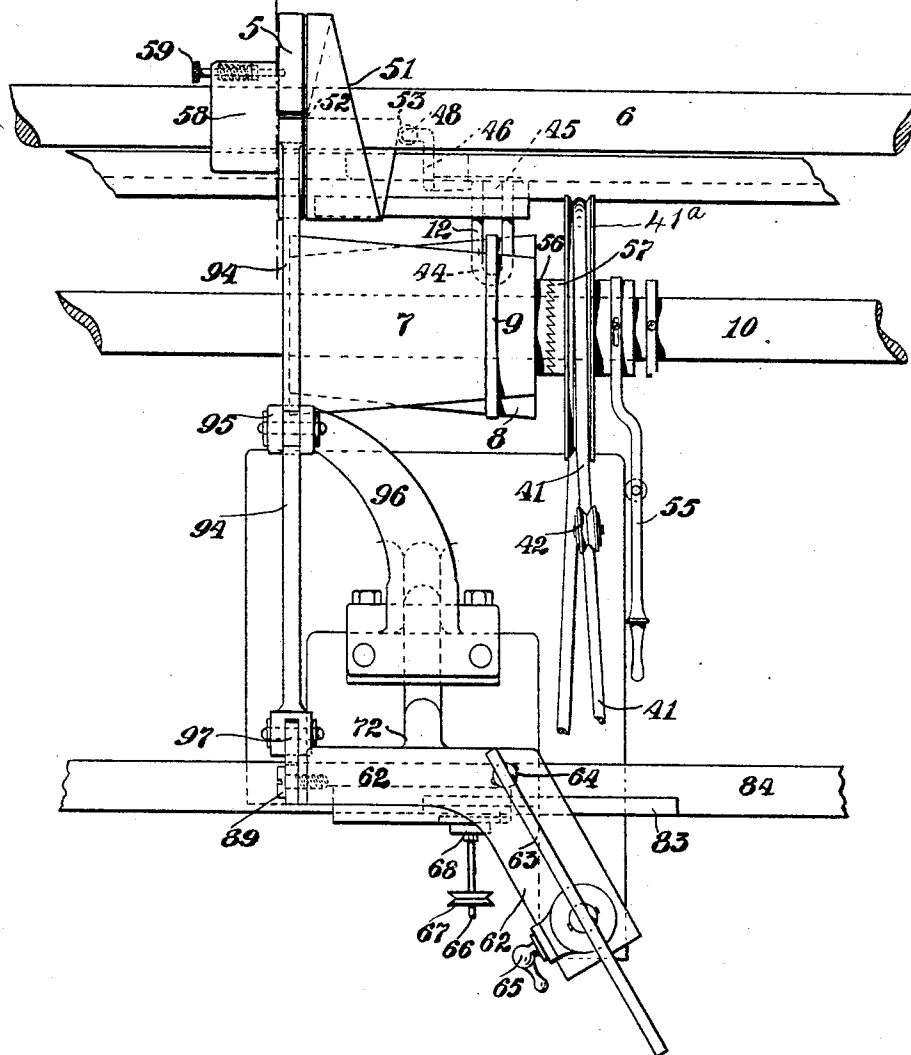
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8 SHEETS—SHEET 6.

Fig. 6.



Witnesses
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APPLICATION FILED APR. 1, 1903.

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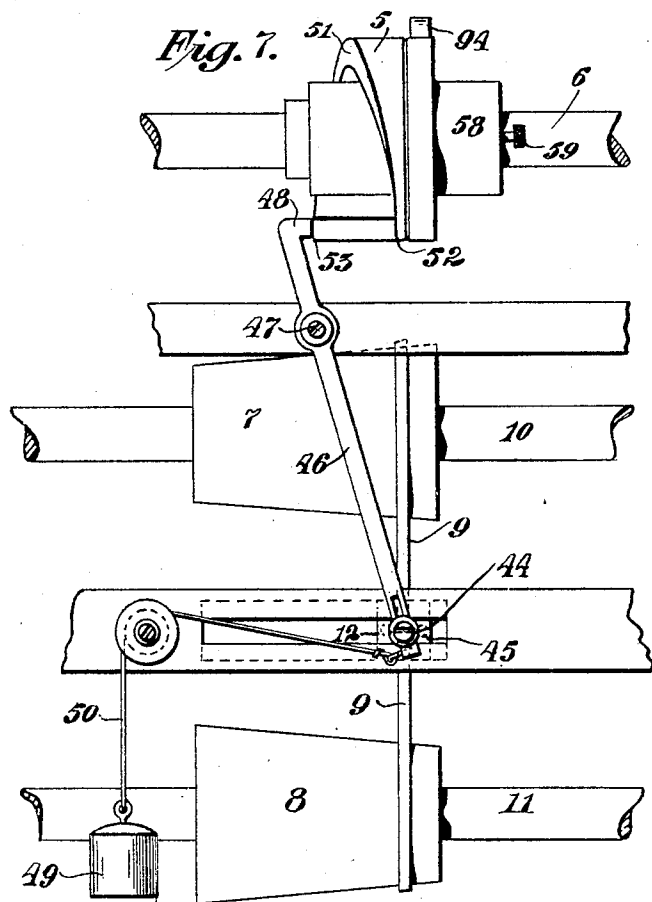


Fig. 12.

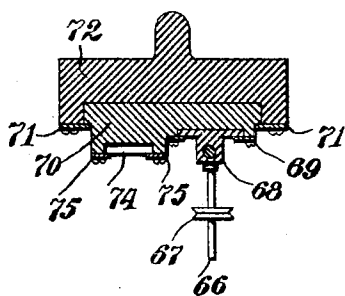
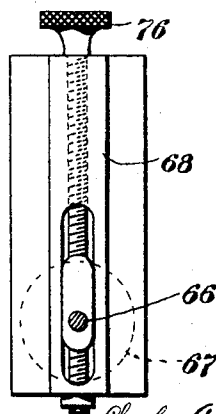


Fig. 13.



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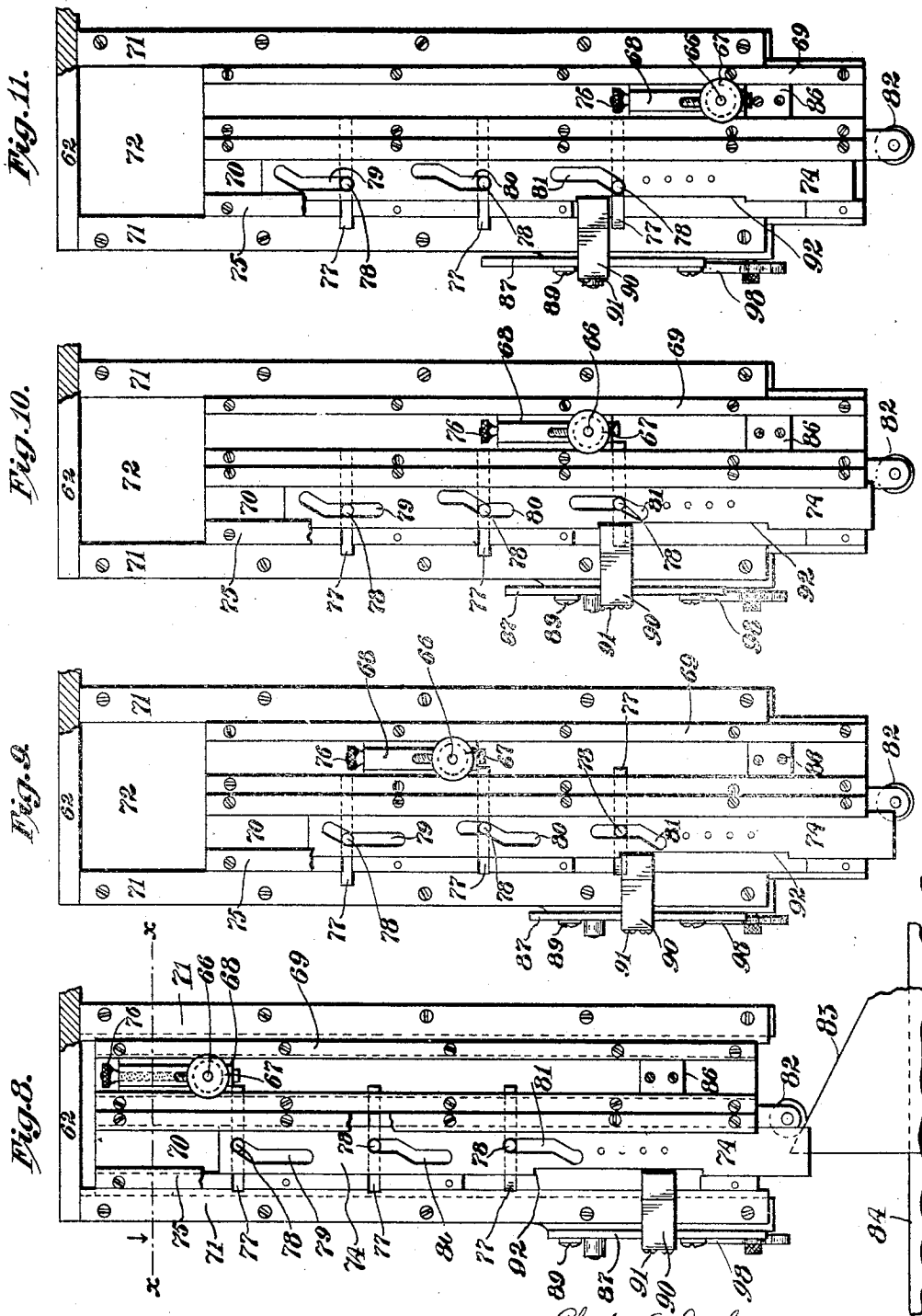
Witnesses
C. Mitchell
A. L. O'Brien

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SPOOLING MACHINE.

APPLICATION FILED APR. 1, 1903.

8 SHEETS—SHEET 8.



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UNITED STATES PATENT OFFICE.

CHARLES ABERNETHY COWLES AND ERNEST OSCAR POLLARD, OF
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SPOOLING-MACHINE.

No. 805,265.

Specification of Letters Patent.

Patented Nov. 21, 1905.

Application filed April 1, 1903. Serial No. 150,582.

To all whom it may concern:

Be it known that we, CHARLES ABERNETHY COWLES and ERNEST OSCAR POLLARD, citizens of the United States, residing at Ansonia, county of New Haven, and State of Connecticut, have invented certain new and useful Improvements in Spooling-Machines, of which the following is a specification accompanied by drawings.

Our invention relates to spooling-machines for spooling wire; and one of the objects of the invention is to enable the wire to be spooled as it is delivered directly from the wire-drawing machine.

Other objects of our invention are to enable different series of spools to be filled at different times, if desired, and in the filling of each spool provision is afforded for decreasing the speed of rotation of the spool as the number of layers of wire increases thereon, so that the rate at which the wire is drawn to the spool is maintained practically constant.

According to our invention the number of parts is reduced and the rapidity of operation is increased with increased strength and efficiency. The automatic and manual control of the machine is simple and readily operated.

Further objects of our invention will hereinafter appear; and to these ends our invention consists of a spooling-machine embodying the features of construction, combinations of elements, and arrangement of parts having the general mode of operation substantially as hereinafter fully described and claimed in this specification and shown in the accompanying drawings, in which—

Figure 1 is a plan view of a wire-drawing machine and a spooling-machine embodying our invention. Fig. 2 is a plan view of the spooling-machine alone drawn to an enlarged scale. Fig. 3 is an end elevation showing the gearing and related parts of the spooling mechanism. Fig. 4 is a side elevation, looking from the front of the machine, of one spooler comprised in the spooling mechanism and drawn to an enlarged scale. Fig. 5 is a transverse sectional elevation of the spooling mechanism drawn on the same scale as Fig. 4 and showing the spooler of Fig. 4 in end view. Fig. 6 is a top plan view of the spooler shown in Figs. 4 and 5 and drawn to the same scale and showing in addition the details of a clutch mechanism. Fig. 7 is an enlarged detail side view of the shifting mechanism for

varying the speed of the spools. Figs. 8, 9, 10, and 11 are detail front views of one of the spoolers, showing the slides in different positions for feeding the wire to different spools at different heights on the rotating spindle. Fig. 12 is a horizontal sectional view on the line *xx* of Fig. 8. Fig. 13 is an enlarged detail view of the means for adjusting one of the guide-rollers for the wire, and Fig. 14 is a detail perspective view of the means for locking the spindle to the upright driving member.

Referring to the drawings, A represents a wire-drawing machine of any suitable construction, and B represents a spooling-machine operated in connection with the wire-drawing machine. As here shown, the wire-drawing machine comprises the frame and two series of drawing-dies C and heads or blocks D, arranged above tanks E, and all disposed on opposite sides of a central longitudinal shaft F, provided with fast and loose pulleys G and H for driving said shaft through the agency of a belt.

Suitable operative connections are provided between the heads or blocks D and the driving-shaft for operating said heads D at different rates of speed, as shown in this instance, the shaft F being provided with the large and small beveled gears I and J, meshing with the beveled gears K and L upon the studs M and N, which are also provided with the gears O and P. Shafts Q of the heads or blocks D extend transversely of the machine and are provided with the pinions R, S, T, and U, meshing with the gears O and P. The gearing is so proportioned that the speed of the heads or blocks D increases in passing from the driving end of the wire-drawing machine to the spooling-machine. The wire is represented at V as being unrolled from the spools W in passing through the dies and around the heads or blocks over the rollers X, about which several turns may be taken, and then guided to the spooling-machine over the individual upright guide-rolls, as shown.

The improved spooling mechanism embodying our invention comprises, essentially, two series of spoolers Y, one of which is shown in side and end view in Figs. 4 and 5, respectively. In the enlarged plan view of Fig. 2 the spoolers are shown arranged in series at each side of the central longitudinal driving-shaft Z, which shaft derives its power from

the driving-shaft F by means of the pinion 1, as shown, meshing with the gear 2 upon the shaft Z. Suitable driving connections are provided for operating the spoolers from the shaft Z. The spools 3, of which there may be any desired number on each spooler, are carried upon suitable spindles 4 at each side of the machine, and means are provided for rotating said spindles and spools, while provision is afforded for varying the speed of rotation of the spindles to maintain constant the rate at which the wire is drawn to the spools. In other words, as the number of layers upon the spools increases the speed of rotation is decreased. Any suitable means may be provided for carrying out this object; but we have shown automatic means controlled by the cams 5 upon the shafts 6, extending substantially longitudinally of the machine. The variable-speed mechanism for each spooler may consist of any well-known mechanical device; but we have illustrated in this instance cone-pulleys 7 and 8, in combination with a traveling belt 9, adapted to be moved along said pulleys by suitable shifters 12, controlled by the cams 5. The speed of the cone-pulleys 7, loose on the shaft 10, is varied in accordance with the position of the belts 9, power being imparted to the cone-pulleys 8 from the driving-shaft 11, to which power is imparted by suitable means, to be described, derived from the shaft Z.

The shaft Z is provided with a beveled gear 13, meshing with a beveled pinion 14, mounted on shaft 17, connected to rotate a beveled gear 15, meshing with a beveled pinion 16 upon the shaft 11, provided with the cone-pulleys 8. The shaft 17 is also provided with a beveled gear 18, meshing with a beveled pinion 19, connected to the other one of the shafts 11 at the other side of the machine. The shaft Z is also provided with a gear 20, meshing with a pinion 21 upon a shaft 22, which shaft is provided with a worm 23, meshing with a worm-gear 24 upon the vertical shaft 25, whereby said vertical shaft is rotated from the shaft Z. The shaft 25 is in this instance provided with a beveled gear 26, meshing with the beveled pinions 27 upon the shafts 28, which extend transversely of the machine and are provided at their outer ends with the heart-shaped cams 29, the use of which will hereinafter appear. The vertical shaft 25 is also provided with a worm 30, meshing with the worm-gears 31 upon the shafts 6, whereby rotation is imparted to said shafts to rotate the cams 5. Suitable upper and lower bearings are provided for the shaft 25, whereby it is firmly supported, but is free to rotate.

An understanding of the spoolers may best be had by referring to Figs. 4, 5, and 6, where a single spooler is illustrated. As all the spoolers are substantially identical, it will be sufficient to describe one.

The spindle 4 is provided with an enlarged

portion 32 near its lower end, which forms a shoulder 33. Upon this spindle, above its shoulder 33, are arranged a number of spools 3, one above the other. The lower extremity of the portion 32 of the spindle 4 is recessed to form a cylindrical cavity 34. The rim of the recessed portion 34 rests upon the upper edge of the rim formed at the upper extremity of a rotatable sleeve 35. Around the rim of the sleeve 35 a band 36 fits, and this band extends up around the portion 32 of the spindle 4. The spindle and sleeve may be interlocked in any suitable manner—as, for instance, by the construction shown in Fig. 14, in which the spindle is shown provided with teeth adapted to recesses in the rim of the sleeve 35, so that rotary motion may be transmitted from the sleeve to the spindle. Inside of the sleeve 35 extends an upright stud 37, which is fixedly secured to a base 38 and is incapable of rotary or other motion. The upper portion of this stud 37 is shouldered, and the upper extremity has secured to it a disk 39 provided with a conical lower surface. Below the disk 39 and above the shoulder, formed integral within the sleeve, are a number of antifriction-balls 40.

Rotary motion may be transmitted to the sleeve 35 by means of a belt 41 passing over the pulley 41^a and deriving motion from the cone-pulley 7, connected to drive the belt-pulley 41^a. As the belt 41 is driven by the pulley 41^a in a vertical plane and drives the sleeve 35 in a horizontal plane, a guide or idler 42 is employed to suitably turn the upper portion of the belt from one plane into the other. The sleeve 35 has a lower bearing 35^b, as shown. The shaft 10 is supported in suitable brackets 43, extending from a fixed part of the frame of the spooling mechanism. The belt-shifter 12 is provided for the purpose of shifting the belt to gradually reduce the speed of the sleeve 35 and the spindle 4 as the diameter of the coils increases. The belt-shifter may be of any suitable construction, but in this instance is shown as consisting of the looped portion or staple 44, extending horizontally from the sliding block 45, slidable in the frame of the machine.

Still referring to but one of the spoolers, it will be seen that there is an arm 46 pivoted at 47 and pivotally and slidably connected to the block 45. The upper end 48 of the arm 46 bears upon the cam 5 and acts as a follower for the cam-surface of said cam. In this instance a weight 49 is connected by the cord 50 to the lower end of the lever or arm 46 and constantly tends to press the upper end 48 of said arm against the surface of the cam 5. The distance from the right-hand edge of cam 5, Fig. 7, to the curved surface 51 of the cam 5, commencing from the point 52, constantly increases to the point 53, from which point there is a straight fall to the point 52 again. In Fig. 7 the cone-pulley 7 is being driven at

its slowest rate of speed, and the end 48 of the arm 46 is about to drop to the low portion of the cam again, in which case the block 45 will be slid along the frame of the machine, returning the belt 9 to the other end of the cone-pulleys, and thus imparting the fastest motion to the cone on shaft 10. It will be seen that the belt 9 is shifted backward and forward at each revolution of the shaft 6, carrying the cams 5. As shown in Fig. 6, a suitable manual clutch may be provided, having the hand-lever 55 and clutch members 56 and 57. The clutch having the clutch members 56 and 57 and operated by the lever 55 is for manually disconnecting the pulley 41^a from the pulley 7 to stop the rotation of the spools. The pulleys 7 and 41^a are loose on the shaft, and the pulley 41^a is adapted to be connected to rotate with the pulley 7 when the clutch members 56 and 57 are moved into engagement. A clutch member 57, as shown, is formed upon the hub of the pulley 41^a and is thus a part of said pulley and is movable therewith. The belt 9 is only shifted to the position for fast speed after the filling of one of the spools 3, and a spool is filled with wire during the time that a cam 5 makes one complete revolution, the parts being timed and the gearing being constructed with this end in view.

By suitably adjusting the cams 5 different groups or series of spools may be filled at different times, as shown, shaft 6 being provided with collars 58, having spring-pins 59, adapted to apertures in the cams 5, whereby the angular position of said cams can be adjusted as desired about the axis of the shaft 6.

The cams 5 are loose on the shaft and are adapted to be connected to be driven therefrom by means of the pins 59, which rotate with the collars 58, fast to the shaft. By this means any cam may be thrown out of operation as desired—as, for instance, when different sets of spools are being changed. Any suitable means, as a frictional or jamming action, may be utilized for maintaining the pins 59 out of engagement with the cams 5 when said pins are once withdrawn.

The spools 3 upon the spindle 4 are held friction tight by means of a lock-nut 60 engaging with a screw-threaded portion near the upper extremity of the spindle. The upper end of the spindle may be supported in a bearing formed in a vertically-adjustable spindle 61, supported in a bracket 62. Adjustments of the spindle 61 are effected by a lever 63, fulcrumed near one end to a support 64, extending upwardly from the bracket 62. As shown, the lever 63 is operated by hand, and a suitable hand-clamp 65 is provided for securing the rod 61 in any desired position. 66 represents a guide by means of which the wire is directed to one of the spools 3, and preferably an antifric-tion-roller 67 should be employed where the wire passes over the guide. The

guide 66 is rigidly connected to a sliding block 68, working behind the vertical guides 69, connected to a sliding plate 70, working vertically behind the guides 71, which are connected to an upright extension 72 on the base 73 of the machine. In other words, the plate or block 68 slides upon ways in the block or plate 70, which in itself is slidably mounted relatively to the standard or upright 72. Another sliding plate 74 is slidably mounted in the ways 75 upon the sliding plate 70. The guide-roller 67 is vertically adjustable by means of the screw 76, and the vertical position of the sliding plate 68 is determined by the horizontally-movable pins or stops 77, slidably supported in the plate 70. From each of the pins or stops 77 extends a lug 78, projecting through the cam-slots 79, 80, and 81 in the plate 74.

Before proceeding further with the description of the spooler it will be stated that in the operation of the machine the plate 68 is constantly reciprocated, thereby winding the wire upon one of the spools in layers from end to end of the same, and means are provided for so reciprocating the guide-roller 67 opposite each one of the spools in turn, beginning with the topmost spool and continuing in order downwardly to the lowermost spool until all of the spools are filled with wire. These operations are carried out automatically, as herein-after stated.

In order to continually reciprocate the roller 67 carrying the wire opposite one of the spools, the slidable plate 70 is moved up and down through a distance equal to the distance between the flanges of a spool. It will be seen that in this instance the lower portion of the plate 70 is provided with a roller 82, bearing upon the inclined surface of a cam 83, carried upon a sliding plate or bar 84, adapted to be reciprocated by means of the heart-shaped cam 29, against which the end of the sliding bar 84 bears, with the interposition of a small follower or roller 85. The weight of the sliding plate 70 and the parts carried thereby is sufficient to force the cam 83 and bar 84 against the cam 29 and cause the bar to follow the cam 29 in one direction to lower the plate 70. The upward stroke is caused by the cam 29, which actuates the bar 84 and pushes the cam 83 beneath the roller 82, thus forcing the plate 70 upward, and thereby raising the roller 67 and completing the stroke in the opposite direction. It will readily be seen that this reciprocating movement of the roller 67 may be imparted thereto with the roller opposite any one of the spools on the spindle. Referring more particularly to Figs. 8, 9, 10, and 11, the sequence of operations is illustrated with all unnecessary parts of the apparatus omitted. In Fig. 8 the sliding plate 68 is shown in its uppermost position, with the pin or stop 77 projecting in the position to prevent the plate 68 from moving downwardly

from the position shown. As described, the roll-plate 70 may be reciprocated vertically to carry the wire opposite the first spool. The operation of the parts is so timed that when the first spool has been completely wound the uppermost pin or stop 77 is automatically withdrawn, as shown in Fig. 9, and the plate 68 is allowed to drop into the position shown, in which instance the second pin or stop 77 limits the downward movement of the plate 68. After the second spool has been filled with wire the second pin or stop 77 is withdrawn, and the plate or slide 68 falls to the position shown in Fig. 10, in which it rests upon the third pin or stop 77. In Fig. 11 the sliding plate 68 has reached its lowermost position and rests upon the stop 86.

In order to automatically retract and project the stops or pins 77, the sliding plate 74 is provided with the cam-slots 79, 80, and 81 therein. Means are provided for sliding the plate 74 upwardly a given distance after each spool is wound with wire. As the plate 74 is moved upward the first time, it will be seen that the first or uppermost stop or pin 77 will be withdrawn to permit the plate 68 to fall. The pin 77 is withdrawn owing to the shape and construction of the cam-slot 79. The cam-slots 80 and 81 are so shaped, however, that the second pin 77 is not withdrawn until the second upward movement of the plate 74, and the third stop or pin 77 is not withdrawn until the third upward movement or step of the plate 74.

In order to raise the plate 74 step by step, suitable means are provided, as shown in this instance, there being a slidable rack 87 provided with the slots 88, through which the pins or guides 89 project, so that the rack 87 may be moved upwardly by suitable means, while at the same time being guided by the pins 89. An angle-piece 90 is secured to the rack 87 by the screws 91, which angle-piece extends into the recessed or notched portion 92 of the plate 74, so that said plate may have a given amount of movement relatively to the angle-piece 90 to permit the reciprocation of the roller 67. Each of the cams 5 is provided with a cam-surface on its periphery, having a cut-away portion 93, and a lever 94, pivoted at 95 to the bracket 96, bears at one end upon the cam-surface having the cut-away portion 93, the other end of said lever being provided with the spring-actuated pawl 97, adapted to coöperate with the teeth of the rack 87. A spring-actuated pawl 98 holds the rack into the position in which it has been moved by the lever 94. It will be seen that as the cam 5 rotates the lever 94 will be rocked, lifting the rack 87 step by step, which lifts the angle-piece 90, thereby thrusting the plate 74 upwardly step by step to actuate the stops 77. The timing of the mechanism is such that the plate 74 is caused to move up-

ward one step after each spool has been fully wound, so that the spools are wound in succession.

To recapitulate, the operation of the machine is as follows: The wire is continuously fed through the wire-drawing machine to the spooling mechanism, passing over the guide-roller 67, arranged adjacent the spools of the spoolers. The spools are constantly rotated by the mechanism described, and they are wound with the wire in succession, beginning with the topmost spool. The slidable plates 70 are constantly reciprocated vertically to wind the wire in layers on the spool, and the speed of rotation of the spools is controlled by the mechanism described in conjunction with the cams 5 and the cone-pulleys 7 and 8. As the diameter of the spool of wire increases the speed of rotation decreases, the belt 9 being moved along the cone-pulleys to accomplish this end. The controlling-cam 5 for one of the spoolers makes one revolution during the time that the winding of one of the spools is being completed. After one spool has been fully wound automatic mechanism comes into operation controlled by the peripheral surface of one of the cams 5, to shift the guide-roller 67 opposite the next succeeding spool to be wound, and at the same time the slidable plate 70 is constantly vertically reciprocated as before.

The operation of successively winding the spools of wire is continuous until the last spool has been wound, and then the hand-lever 55 is operated to disconnect the pulley 41^a from the pulley 7, thereby stopping the rotation of the spools, and the slidable plate 68 is raised by hand and the operation is continued over again with new spools. Any or all of the spoolers may be operated at the same time or at different times by adjusting the rotary position of the cams 5.

During the stopping and replacing of the spools on a spindle the respective cam 5 is disconnected from the shaft 6 by withdrawing the pin 59 for said cam. The plate 74 is lowered to the position it is to occupy when the first spool of the new series is wound by the withdrawal of the cam 83.

Obviously, some features of our invention may be used without others, and our invention may be embodied in widely-varying forms.

Therefore, without limiting ourselves to the construction shown and described nor enumerating equivalents, we claim, and desire to secure by Letters Patent, the following:

1. In a spooling mechanism, the combination with a spooler having a spindle and spools, of means for operating said spindle, means for delivering wire to said spooler, means for automatically and successively winding said spools with wire, and means for decreasing the speed of rotation of the spin-

dle as the diameter of the spool being wound increases, for substantially the purposes set forth.

2. In a spooling mechanism, the combination of series of spoolers having spindles and spools, means for rotating said spindles, means for varying the speed of rotation, means for leading wire to the spools, and means for successively winding the spools on the spindles with the wire, for substantially the purposes set forth.

3. In a spooling mechanism, the combination of a series of spoolers, means for leading wire thereto to be wound upon the spools, means for winding the wire upon the spools, and adjustable mechanism for enabling different series of spools to be filled at different times, for substantially the purposes set forth.

4. In a spooling mechanism, the combination of a spooler having a spindle adapted to receive spools for the wire, means for leading wire to said spooler, means for reciprocating the wire as it is wound, and mechanism for automatically and successively winding said spools, for substantially the purposes set forth.

5. In a spooling mechanism, the combination of a spooler having a spindle adapted to receive the spools upon which the wire is to be wound, a slidable plate and means for reciprocating the same, a guide carried by said plate for the wire to be wound, and means for automatically adjusting the position of said guide upon the reciprocating plate, whereby the spools may be wound in succession and from end to end upon each spool, for substantially the purposes set forth.

6. In a spooling mechanism, the combination of series of spoolers having spindles adapted to receive the spools for the wire, means for rotating said spindles, means for varying the speed of the spindles as the wire is wound, a guide for the wire, and means for reciprocating said guide opposite the spools in succession, whereby the wire is wound upon the spools successively, for substantially the purposes set forth.

7. In a spooling mechanism, the combination of a series of spoolers adapted to receive the spools upon which the wire is to be wound, means for delivering the wire to said spools, and means for automatically and successively reciprocating the wire opposite each spool, whereby the spools may be wound with wire in succession, for substantially the purposes set forth.

8. In a spooling mechanism, the combination with spindles adapted to receive the spools for the wire, of a guide for delivering the wire to the spools, means for reciprocating said guide, and means for automatically moving said guide opposite each spool successively as one of the spools is wound, for substantially the purposes set forth.

9. In a spooling mechanism, the combina-

tion of a spindle adapted to receive the spools for the wire, a guide for delivering the wire to the spools, and means for constantly reciprocating the same, means for automatically moving said guide step by step opposite the spools in succession, and means for varying the speed of rotation of the spools as the wire is wound thereon, for substantially the purposes set forth.

10. In a spooler, the combination of a reciprocating guide for delivering the wire to the spools, and means for automatically moving said guide opposite another spool after one of the spools has been wound, for substantially the purposes set forth.

11. In a spooler, the combination of a reciprocating guide for delivering the wire to the spools, means for automatically moving said guide opposite another spool after one of the spools has been wound, and means for decreasing the speed of rotation of each spool as the wire is wound thereon, for substantially the purposes set forth.

12. In a spooling mechanism, the combination with the rotating spindle for the spools, of a slidable plate arranged adjacent the spools, means for reciprocating said plate, and other plates adapted to be moved relatively to the said first-named plate, one of said last-named plates being provided with a guide, and the other with stops for limiting the movement of said guide, whereby the spools may be wound with wire in succession, for substantially the purposes set forth.

13. In a spooling mechanism, the combination with means for delivering the wire to the spools and for winding it thereon, of a cam for controlling the speed of rotation of the spools and the position of the guide relatively thereto, for substantially the purposes set forth.

14. In apparatus of the class described, the combination with a multiple-wire-drawing machine for drawing a plurality of wires at a time, of a plurality of spooling devices one for each wire, a centrally-arranged driving-shaft for imparting power to the wire-drawing machine, and the spooling devices from the same source, operative connections between said shaft and the wire-drawing machine, and operative connections between said shaft and the spooling devices, rollers about which the wires are passed arranged between the wire-drawing machine and spooling devices, suitable guides for the several wires, each wire being led from the rollers over the guides directly to a spooling device, and operative connections for driving the spooling devices to spool the wires as the wires are delivered from the wire-drawing machine, for substantially the purposes set forth.

15. In apparatus of the class described, the combination with a multiple-wire-drawing machine for drawing a plurality of wires at a

time, of a plurality of spooling devices, one
for each wire, a centrally-arranged driving-
shaft for imparting power to the wire-draw-
ing machine and the spooling devices from
5 the same source, operative connections be-
tween said shaft and the wire-drawing ma-
chine, operative connections between said
shaft and the spooling devices, means for guid-
ing the several wires from the wire-drawing
10 machine directly to the spooling devices, and
operative connections for driving the spool-

ing devices to spool the wires as the wires are
delivered from the wire-drawing machine, for
substantially the purposes set forth.

In testimony whereof we have signed this 15
specification in the presence of two subscrib-
ing witnesses.

CHARLES ABERNETHY COWLES.
ERNEST OSCAR POLLARD.

Witnesses:

HENRY H. WILSON,
EDWIN D. ROBINS.