No. 889,265. PATENTED JUNE 2, 1908.

G. B. SMITH.

WIRE COILING MACHINE.

APPLICATION FILED MAR. 4, 1907.

3 SHEETS—SHEET 1.

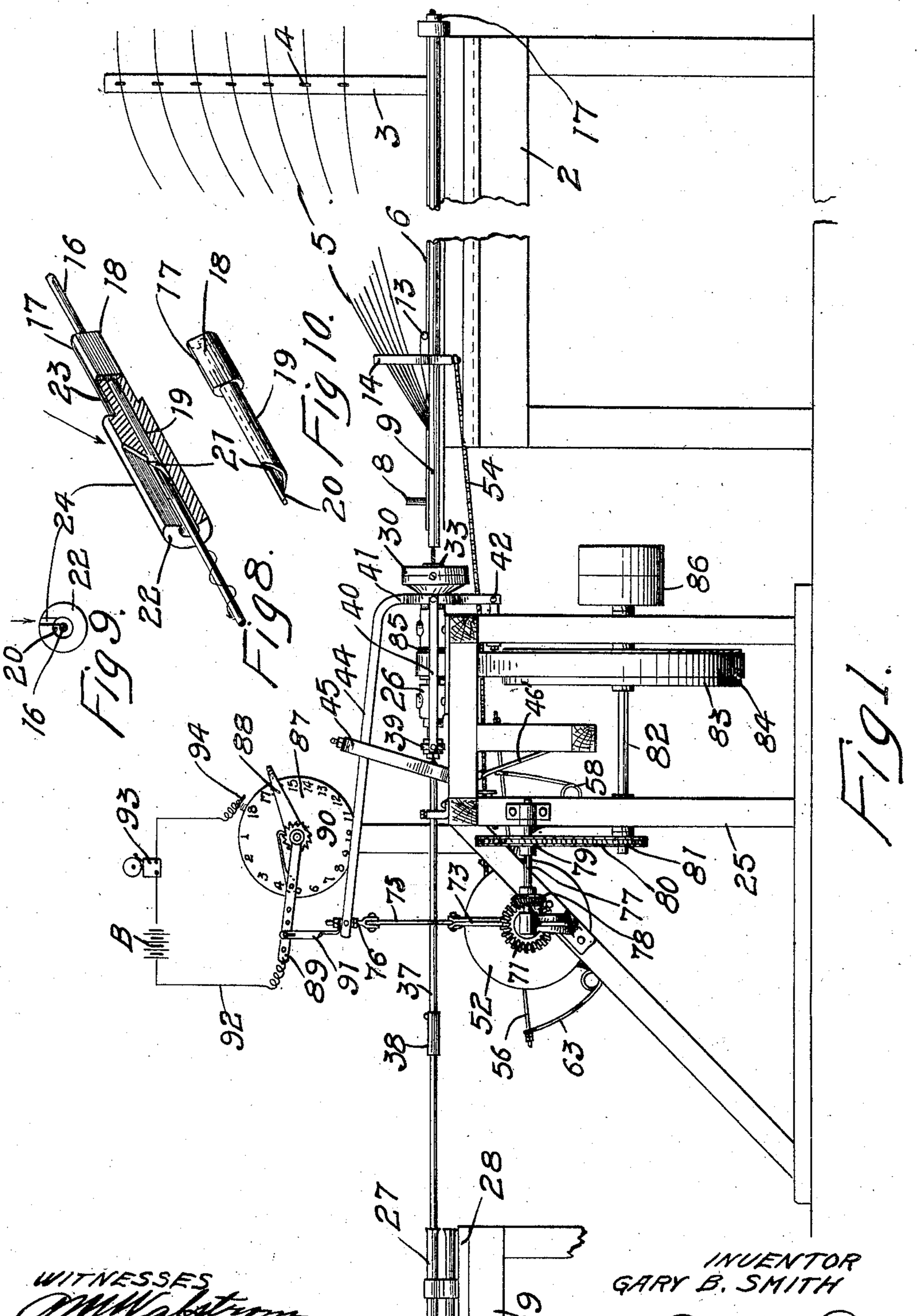

FIG 1.

FIG 10.

FIG 8.

FIG 9.

WITNESSES

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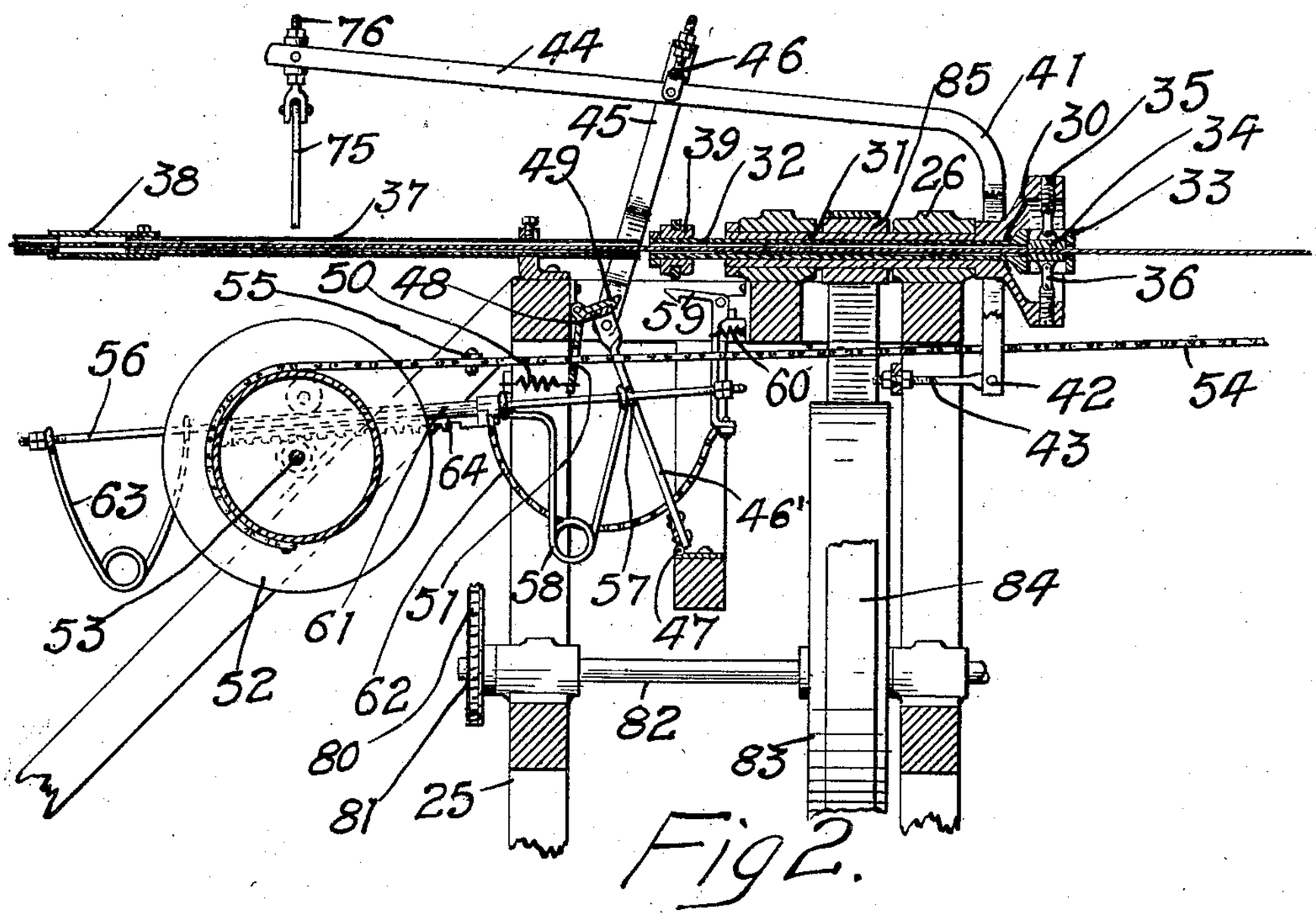

Fig 2.

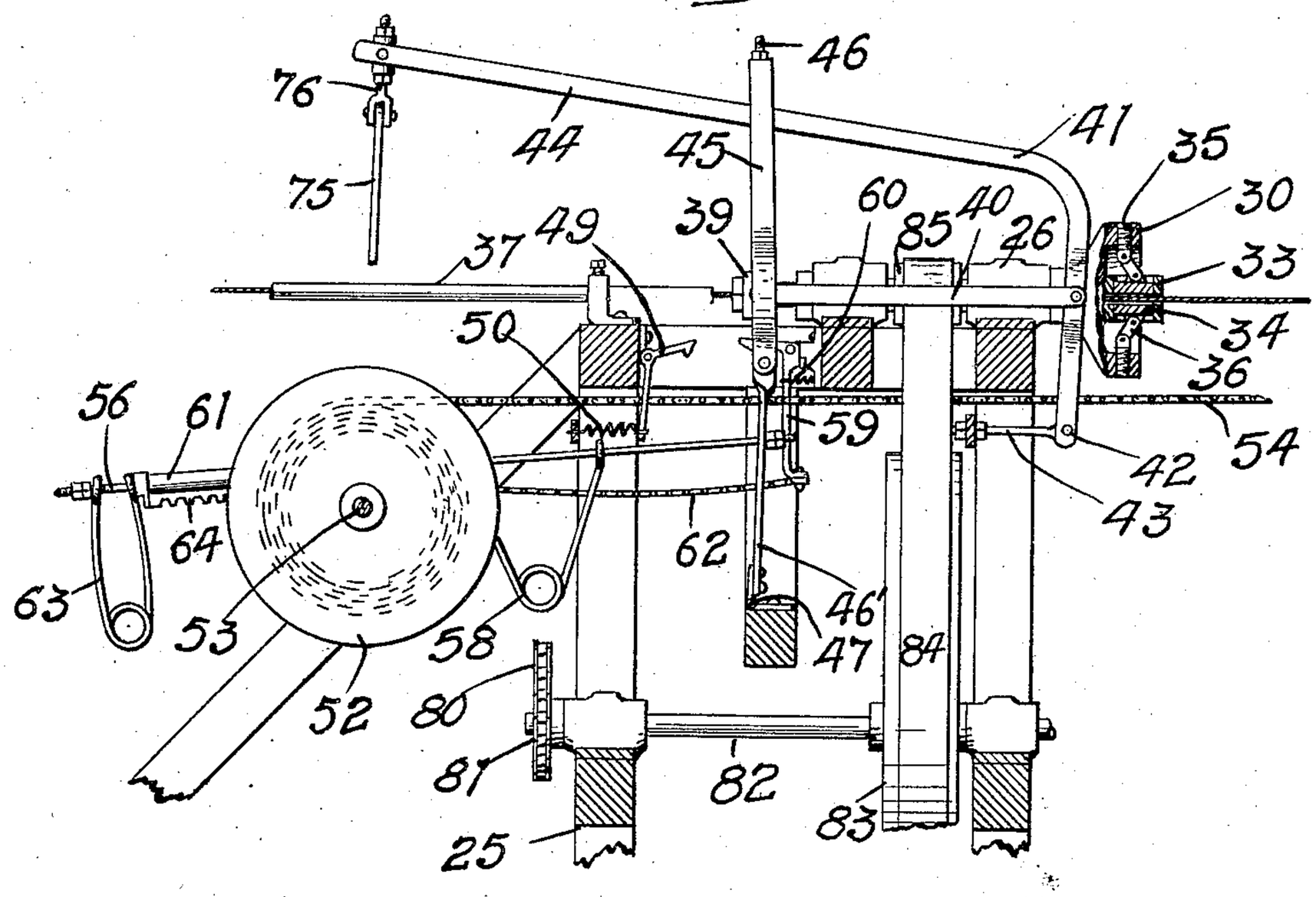

Fig 3.

WITNESSES
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3 SHEETS—SHEET 3.

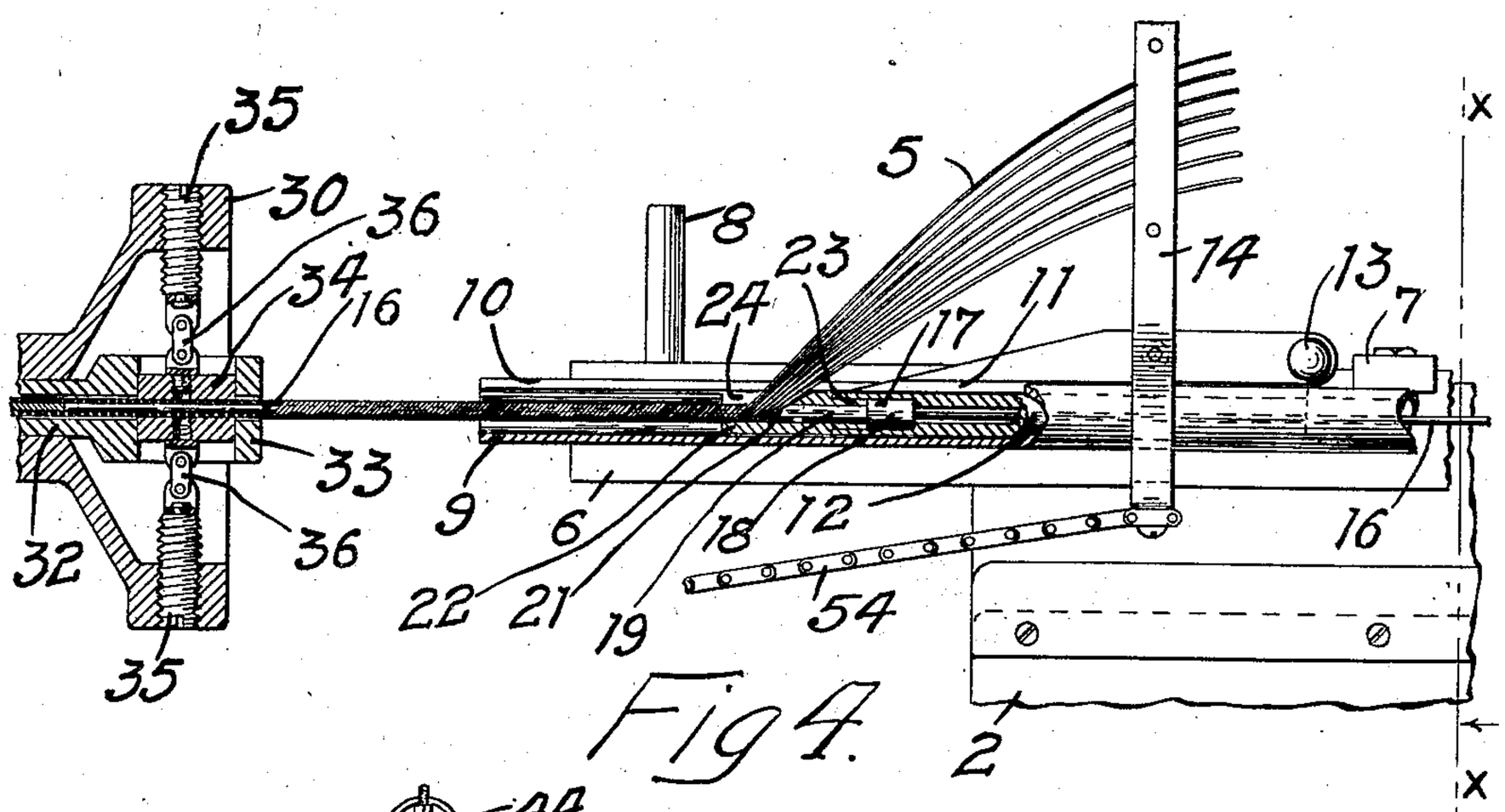

Fig 4.

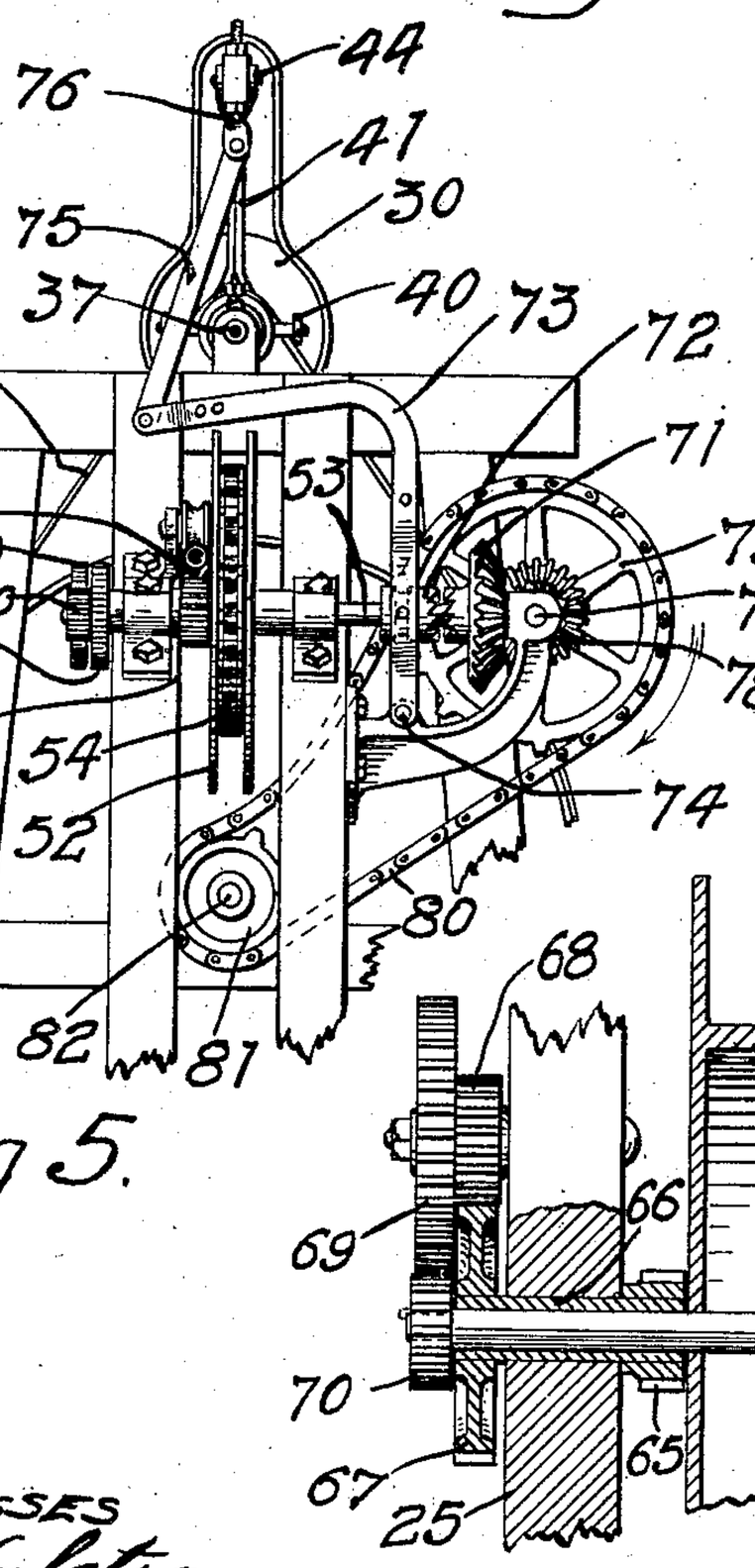

Fig 5.

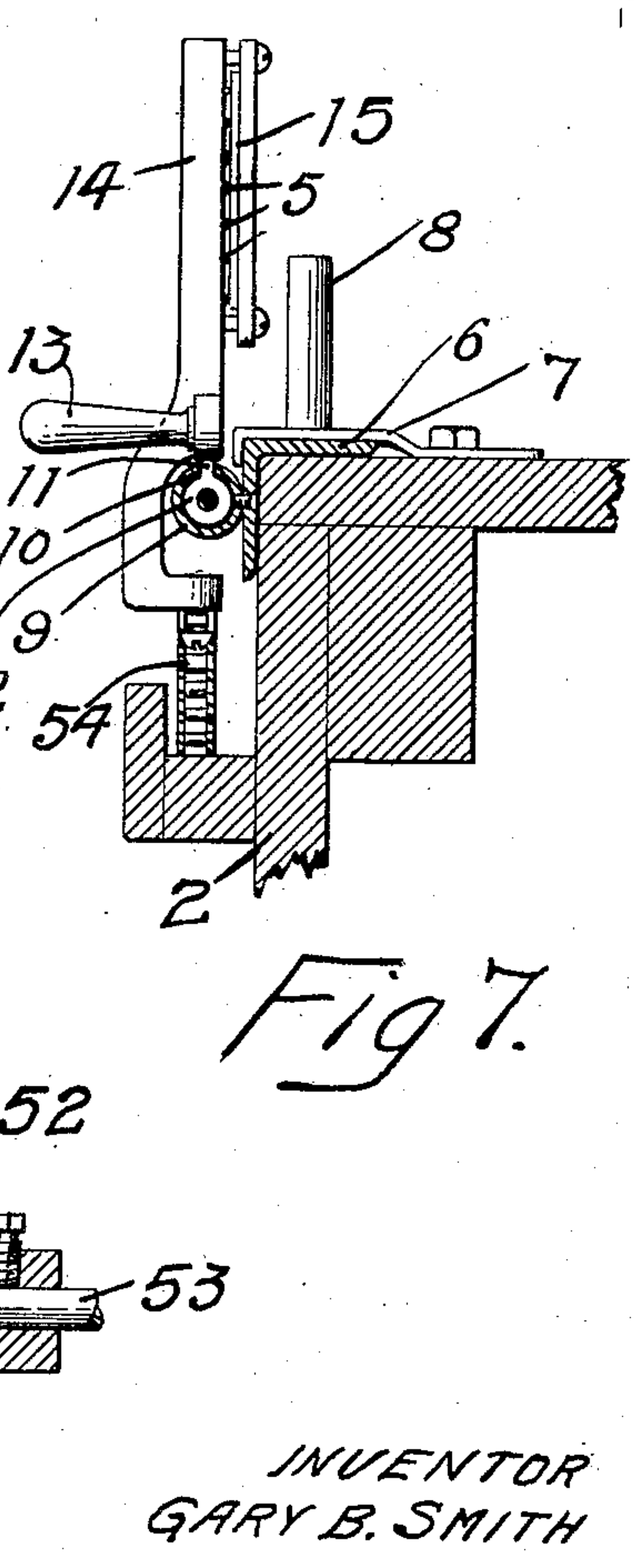

Fig 7.

Fig 6.

WITNESSES

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UNITED STATES PATENT OFFICE.

GARY B. SMITH, OF MINNEAPOLIS, MINNESOTA, ASSIGNOR TO SMITH BEDDING CO., OF MINNEAPOLIS, MINNESOTA, A CORPORATION OF MINNESOTA.

WIRE-COILING MACHINE.

No. 889,265. Specification of Letters Patent. Patented June 2, 1908.

Application filed March 4, 1907. Serial No. 360,609.

To all whom it may concern:

Be it known that I, GARY B. SMITH, of Minneapolis, Hennepin county, Minnesota, have invented certain new and useful Improvements in Machines for Coiling Wire, of which the following is a specification.

My invention relates to wire spring coiling machines, and the object of the invention is to improve the machine shown and described in Letters Patent of the United States, issued to me July 4, 1905, No. 793,688.

The invention consists generally in various constructions and combinations, all as hereinafter described and particularly pointed out in the claims.

In the accompanying drawings, forming part of this specification, Figure 1 is a front elevation of a wire coiling machine embodying my invention. Fig. 2 is a vertical sectional view of one end of the machine illustrating one position of the moving parts. Fig. 3 is a similar view illustrating the opposite position of the same parts. Fig. 4 is a detail view illustrating the mechanism for coiling the wires. Fig. 5 is an elevation of the opposite end of the machine. Fig. 6 is a detail sectional view illustrating the driving mechanism for the rack bar. Fig. 7 is a sectional view on the line *x*—*x* of Fig. 4. Figs. 8, 9 and 10 are detail views of the wire former or coiling device.

In the drawing, 2 represents a suitable table whereon an upright standard 3 is mounted having guides 4 one above another for the series of wires 5 that are run through said guides from a series of reels or drums, not shown, as they form no part of my present invention.

6 is an angle bar fitting the corner of the table 2 and slidable thereon under suitable guides 7. The angle bar has a handle 8 by means of which it can be moved lengthwise on the table. A stationary pipe 9 is secured to the angle bar as shown in Fig. 7, and extends horizontally along the vertical flange of the same. The pipe 9 has a longitudinal slot 10 in which a flange 11 provided on a tube 12 within said pipe, is adapted to slide. A portion of the flange 11 extends a considerable distance above the pipe and is provided with a handle 13 for convenience in moving the tube back and forth. This tube forms the reciprocating carriage of the machine. A standard 14 is mounted on the carriage and has a guide 15 through which the wires pass from the guides 4 to the former or the wire-coiling device that is carried by the reciprocating carriage.

A mandrel 16 extends through the tube 12 and has one end mounted in a bearing at the end of the tube which allows the mandrel to be turned freely in either direction. The former, as indicated in Fig. 8, consists of two parts, a head 17 having a flattened face 18 forming a bearing surface for a locking screw, not shown, and a former tube 19 through which the mandrel extends, said tube terminating in a beveled end 20 having a notch 21 with one edge forming a continuation of the said beveled edge and against which the wires abut during the coiling operation. The head 17 is fastened in the tube 12 by any suitable means and slides therewith on the mandrel. The other portion of the former comprises a cylinder 22 having a bore of sufficient size to allow the former tube to be slipped therein, said cylinder having a reduced extension 23 on one end that is cut away on one side to correspond to the flattened face of the head 17. The cylinder 22 has a longitudinal slot 24 through which the wires are introduced side by side to the former tube, the slot being of sufficient width to allow the wires to be fed freely therein but too narrow to allow them to overlap one another. The wires as they pass through the slot 24 will engage the beveled edge of the former tube and be guided thereby as the mandrel revolves to form the coil. The slot 24, as shown in Fig. 9, is tangentially arranged with respect to the bore of the cylinder and one end has an inclined wall the surface of which is in line substantially with the beveled end of the former tube. The former head and the cylinder are free to slide with the carriage on the revolving mandrel but will be fixed against rotary movement thereon. The pressure of the coil in forming the cable will cause the carriage to move from the left toward the right.

To return the carriage to its starting point after a section of wire has been coiled, and to revolve the coiling mechanism, I prefer to provide the following described apparatus: 25 is a suitable frame having bearings 26 thereon through which the mandrel and the inclosing wire cable passes. Tubes 27 and 28 are provided on a table 29 and into these tubes the cable is fed. The tubes are extended for a considerable distance outside

the building if preferred, and when one tube is filled the cable can be transferred to the other tube while the first cable is being removed. In this way the operation of the machine is rendered continuous.

A chuck 30 has a sleeve 31 fitting within the bearings 26 and adapted to revolve therein, and a tube 32 is arranged within the sleeve 31 and is slidable lengthwise therein and has a head 33 at its outer end wherein gripping jaws 34 are arranged and connected with adjusting screws 35 in the chuck 30 by links 36. These links permit the head 33 to be reciprocated to open or close the jaws and release or grip the cable. This construction of the chuck and the jaws I regard as an important improvement over the mechanism provided for the same purpose in my former patent. A continuation 37 of the tube 32 is connected to the tube 27, a coupling 38 permitting the separation of the tube sections and access to the table. A clutch collar 39 is mounted on the inner end of the tube 32 and connected by bars 40 with a lever 41 that is pivoted at 42 on an adjustable bolt 43 and extends up on both sides of the chuck 30 and has a horizontal portion 44 overhanging the clutch collar 39. A yoke 45 has an adjustable pivot 46 on the part 44 and depending therefrom straddles the tube 37 and is pivotally connected to the upper end of a bar 46′ that has a hinge 47 at its lower end on the frame 25. An extension 48 is provided on the upper end of the bar 46′ and is adapted to be engaged by a dog 49 that is pivoted on the frame 25 and is normally held in position to lock the said bar by a spring 50 and has a hole 51 extending therethrough. A drum 52 is mounted on a shaft 53 and a chain 54 is wound on said drum and extends through the hole 51 and is attached to the depending end of the standard 14. A stop 55 is provided on said chain in position to engage the dog 49 and trip it to release the bar 46′. A rod 56 is mounted in said frame and extends through a hole 57 in the bar 46′, and a spring 58 U-shaped in form has its ends coiled around the rod 56 and normally tends to hold the bar 46′ out of contact with the dog 49 and in position to be engaged by a dog 59 that is held forward by a spring 60. A tube 61 is slidable on the rod 56 and has a flexible connection 62 with the lower end of the dog 59. A spring 63 also mounted on the rod 56 is put under tension when the tube 61 moves toward the left to return the bar 46′ into engagement with the dog 49 when it is released by the dog 59.

A rack bar 64 is mounted on the under side of the tube 61 and meshes with a pinion 65 secured on a sleeve 66 that is loose on the shaft 53 and carries a gear 67 meshing with a pinion 68 that is secured to a gear 69 which in turn meshes with a pinion 70 secured on the shaft 53. The speed of the rack bar is thus very much less than that of the shaft 53 on which the drum is mounted. A bevel gear 71 is secured on the shaft 53 and a clutch 72 has an operating lever 73 pivoted at 74 and connected by a link 75 with the horizontal extension 44 of the lever 41, the connection of the link 75 with the lever being preferably by means of a bolt 76 which permits adjustment for the purpose of regulating the time of operation of the clutch. A shaft 77 has a gear 78 meshing with the gear 71 and a sprocket 79 is mounted on the shaft 77 and connected by a chain 80 with a sprocket 81 on the shaft 82 that carries a pulley 83 from which a belt 84 extends to a pulley 85 on the sleeve 31 for the purpose of driving it and the chuck 30. A pulley 86 on the shaft 82 is connected with a suitable source of power, not shown.

Upon the frame 25 a dial 87 having a series of figures on its face, is mounted. A pointer 88 is arranged to travel over the face of the dial and has an arm 89 and a ratchet mechanism 90, said arm being connected by a strap 91 with the part 44 of the lever 41. A conductor 92 is attached to the arm 89 and extends to a battery B and the signal bell 93, and from thence to a contact point 94 in the path of the indicator 88, so that when the pointer contacts with this point the circuit will be closed and the bell will ring to warn the operator that a certain length or number of lengths of the cable have been formed.

In the operation of the machine the wires are introduced into the former and coiled around the mandrel and when the parts are in the position indicated in Fig. 2 the coil will be gripped by the jaws 33 and held securely. The jaws will then be revolved through the driving connection described and the mandrel turned with them and the wires drawn into the former and coiled therein following the beveled edge 20, the mandrel turning freely on its ball bearings. The pressure on the coiling former will move the carriage from left to right, as shown in Fig. 1, until it reaches a point where the chain 54 will be nearly unwound from its drum and the stop 55 engages the dog 49 to trip the same and release the bar 46′, whereupon the spring 58 will throw the said bar and the lever 45 to the position indicated in Fig. 3 when the bar will be engaged by the dog 59 and temporarily locked. As the lever 45 swings to a vertical position the horizontal portion 44 of the lever 41 will be swung upward and the collar 39 through its connections 40 with the lever 41 will be moved to operate the sleeve 32 and open the gripping jaws. The upward movement of the lever 41 will operate the clutch lever 73 and cause the shaft 53 to be set in motion, whereupon the drum 52 will be revolved to wind up the

chain 54 and move the rack bar 64 toward the left end of the rod 56 against the tension of the spring 63. This movement will continue until the flexible connection 62 is drawn taut, when the dog 59 will be oscillated to release the bar 46′, and the tension of the spring 63 working through the rod 56 will swing the bar and the lever 45 back to the position shown in Fig. 2 and into the path of the dog 49. This movement of the bar 46′ will return the lever 41 to the position shown in Fig. 2 and close the gripping jaws again. During the time the chain 54 is being wound up the former carriage will be moved along the mandrel to its starting point near the gripping jaws when the machine is ready to coil another section of the cable.

I claim as my invention:—

1. In a wire coiling machine, a tube, a revolving mandrel therein, a carriage slidably mounted on said mandrel, and a former mounted in said carriage and slidable therewith in said tube, said former and tube being fixed against rotary movement, and said carriage being moved in one direction on said mandrel by the pressure of the coil as it is formed, and means for returning said carriage at predetermined intervals to its starting point, substantially as described.

2. The combination, with a tube having a longitudinal slot, of a revolving mandrel provided within said tube, a carriage slidable on said mandrel and having a web projecting through the slot in said tube and carrying a suitable handle, a former mounted on said carriage and slidable therewith but locked against rotary movement, the wires to be coiled being introduced into said former through the slot in said tube, and said carriage being moved in one direction by the pressure of the wire coil, and means for returning it to its starting point when a predetermined length of cable has been coiled, substantially as described.

3. In a wire coiling machine, a former comprising a head having a former tube terminating in a beveled end, and a cylinder having a central bore to receive said tube and a longitudinal slot tangentially arranged with respect to said bore and through which the wires are introduced to said former tube and the beveled end thereof, substantially as described.

4. In a wire coiling machine, a cable former comprising a head having a former tube terminating in a beveled end, a cylinder having a central bore to receive said tube and the longitudinal slot opening into said bore, the wall of said cylinder at one end of said slot being inclined and in line substantially with the bevel on the end of said former tube, and said slot being of sufficient width to allow the wires to be inserted therein side by side without lapping by one another.

5. In a wire coiling machine, the combination, with a guide and a reciprocating carriage therein, of a revolving mandrel operating in said carriage, and a cable former carried by said carriage and reciprocating therewith, but locked against rotary movement, substantially as described.

6. The combination, with a table, of an angle bar fitting on the corner thereof and provided with a suitable handle, a tube secured to the vertical flange of said angle bar, a revolving mandrel within said tube, a reciprocating carriage within said tube, and a former mounted in said carriage and adapted to reciprocate therewith, but locked against rotary movement, and said tube having a longitudinal slot through which the wires are introduced to said former, substantially as described.

7. In a wire coiling machine, a chuck having a sleeve and a driving means therefor, a tube slidably mounted within said sleeve, cable gripping jaws carried by said sleeve and having adjustable connections with said chuck, and means for reciprocating said sleeve to open or close said jaws, said means comprising an oscillating bar, a locking dog normally engaging said bar, and means for tripping said dog when a pre-determined length of cable has been formed.

8. In a wire coiling machine, a chuck, a reciprocating sleeve mounted therein, jaws carried by said sleeve and adapted to engage the cable, adjusting screws mounted in said chuck, links connecting said adjusting screws with said jaws, and means for reciprocating said sleeve to open and close said jaws, said means comprising an oscillating bar, a locking dog therefor, and means for tripping said locking dog when a pre-determined length of cable has been formed.

9. In a wire coiling machine, the combination, with a chuck having cable-gripping jaws, a clutch collar operatively connected with said jaws, a lever connected with said clutch collar, and means for operating said lever at predetermined intervals to move said clutch collar and release said jaws, substantially as described, said means comprising an oscillating bar, a locking dog therefor, and means for tripping said dog when a predetermined length of cable has been formed.

10. In a wire coiling machine, a cable gripping chuck, a lever for operating the same to release or clamp the cable, an oscillating bar connected with said lever, a locking dog for said bar, means for tripping said dog to release said bar and operate said lever to open the jaws of said chuck, a second locking dog, a spring device for throwing said bar into the path of said second locking dog, means for tripping said second locking dog at predetermined intervals, and a second spring put under tension at intervals for returning said bar to its normal position in the path of said first-named locking dog.

11. In a wire coiling machine, the combination, with a chuck having cable-gripping jaws, of an oscillating bar operatively connected with said jaws to open or close the same, a locking dog normally held in position to engage said bar, means for tripping said locking dog when a predetermined length of cable has been formed, a rod having a sliding connection with said bar, a spring mounted on said rod and normally tending to force said bar out of the path of said dog, a second locking dog arranged to engage said bar, a second spring mounted on said rod, a tube slidable on said rod, and having a rack bar and a flexible connection with said second dog to place said flexible connection under tension and trip said second dog and compress said second spring to return said bar to its normal position in the path of said first-named dog, substantially as described.

12. In a wire coiling machine, a tube, a revolving mandrel therein, a carriage slidably mounted on said mandrel, and a former mounted in said carriage and slidable therewith in said tube, said former and tube being fixed against rotary movement and said carriage being moved in one direction by said mandrel by the pressure of the coil as it is formed.

13. In a wire coiling machine, the combination with a chuck having gripping jaws, of an oscillating bar pivotally connected with said jaws, a locking dog for said bar, means for tripping said dog when a pre-determined length of cable has been formed, a second locking dog, and means for moving said bar into the path of said dogs, substantially as described.

14. In a wire coiling machine, the combination with a chuck having cable gripping jaws, of an oscillating bar connected with said jaws, means for temporarily locking said bar at the limit of its oscillation in each direction, and a spring put under tension by the movement of said bar in one direction for returning it to its opposite position when released, substantially as described.

15. In a wire coiling machine, the combination with a chuck having gripping jaws, of means connected with said jaws to open or close the same, locking devices adapted to engage said means, a rod having a sliding connection with said means, springs provided on said rod, and means for placing said springs under tension to move said opening and closing means into or out of the path of said locking device, substantially as described.

16. In a wire coiling machine, the combination with a chuck having gripping jaws, of a lever operating the same to release or clamp the cable, an oscillating bar connected with said lever, a locking dog for said bar, and means for tripping said dog to release said bar and operate said lever to operate the jaws of said chuck.

17. In a wire coiling machine, a cable gripping chuck, a lever for operating the same to release or clamp the cable, an oscillating bar connected with said lever, a locking dog for said bar, means for tripping said dog to release said bar, a second locking dog, means for throwing said bar into the path of said second locking dog, and means for tripping said second locking dog at predetermined intervals.

In witness whereof, I have hereunto set my hand this 19th day of February 1907.

GARY B. SMITH.

Witnesses:
J. B. ERA,
RICHARD PAUL.