A. H. ADAMS.

SEMI-AUTOMATIC WINDING MACHINE.

APPLICATION FILED AUG. 29, 1912.

1,117,620.

Patented Nov. 17, 1914.

4 SHEETS—SHEET 1.

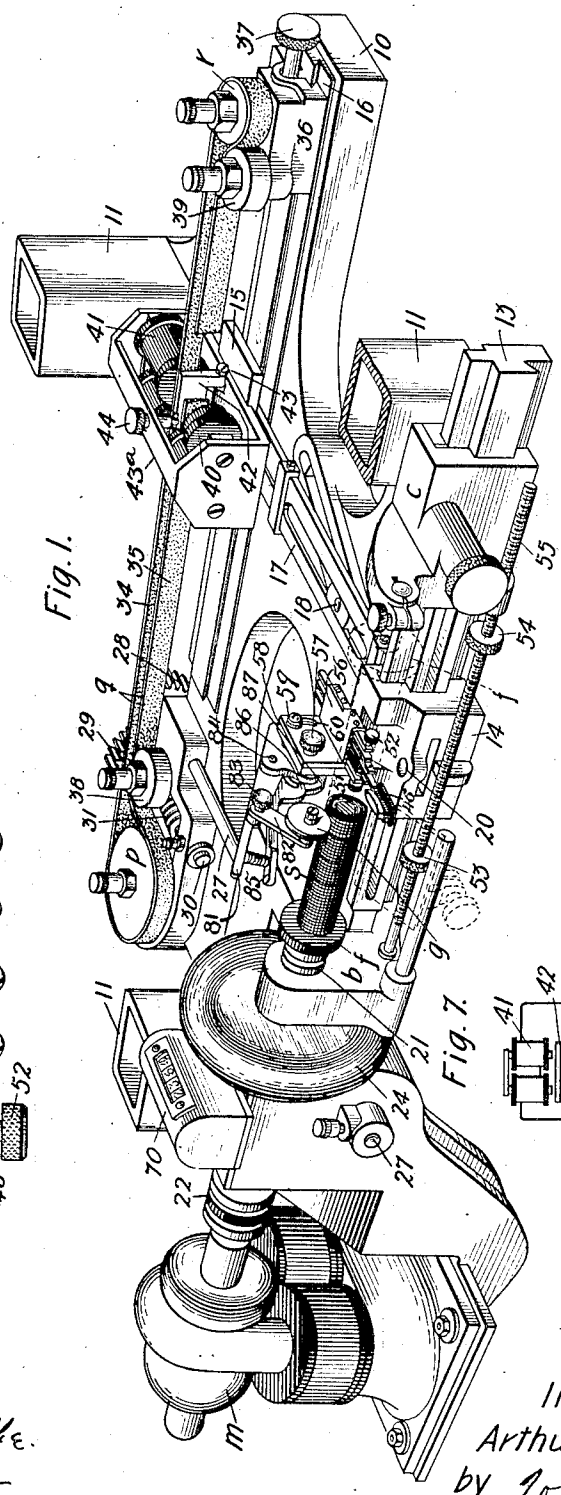


Fig. 1.

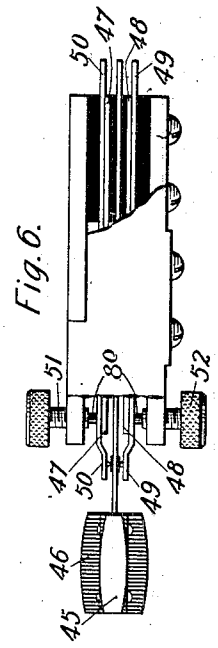


Fig. 6.

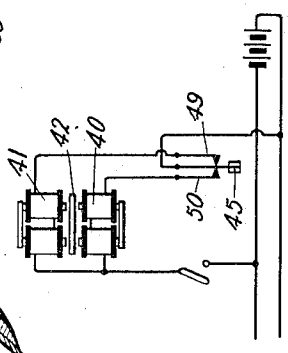


Fig. 7.

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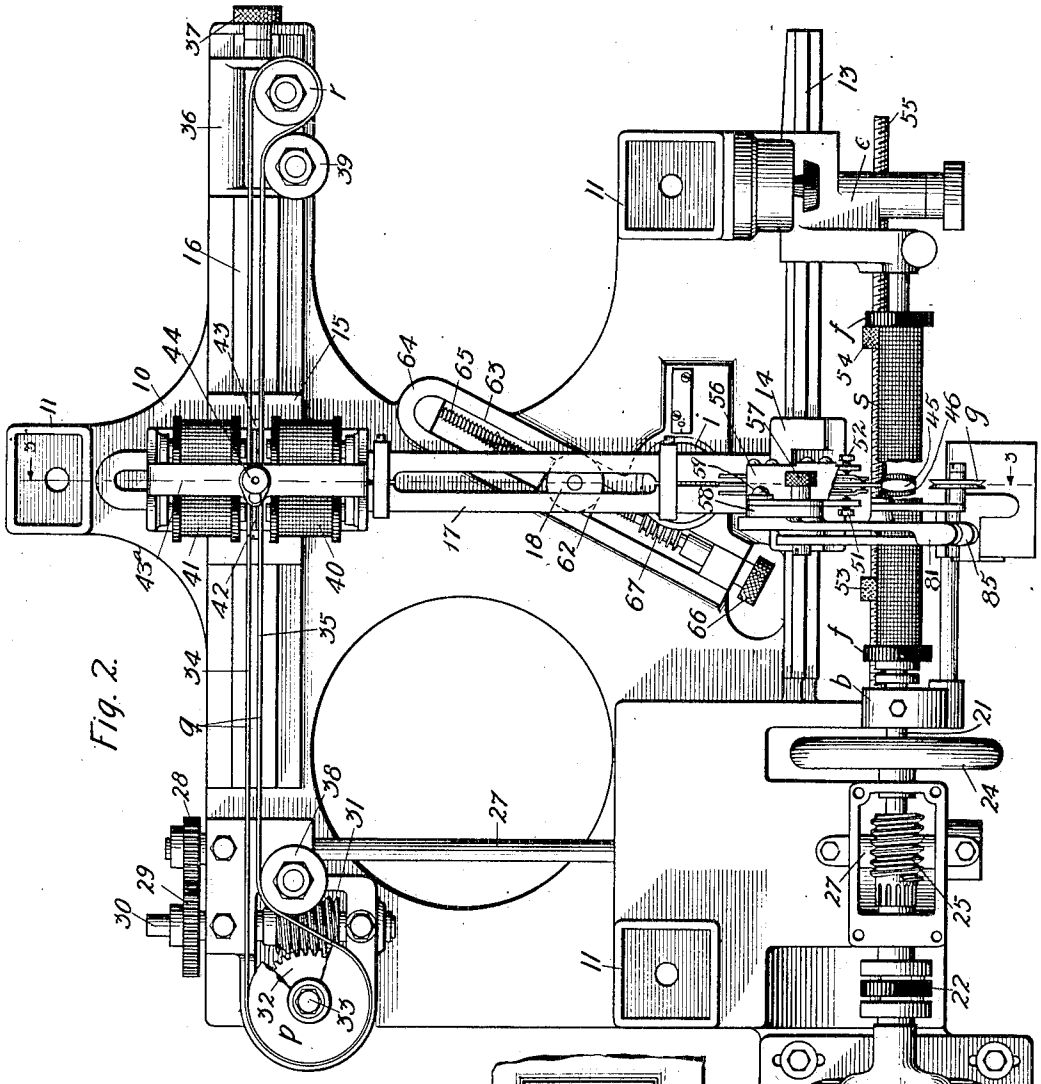


Fig. 2.

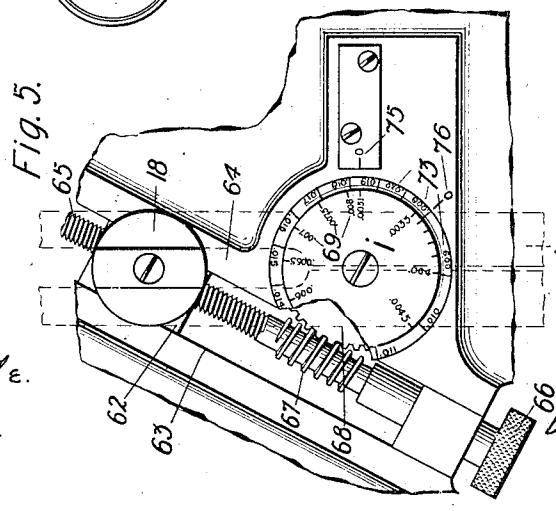


Fig. 5.

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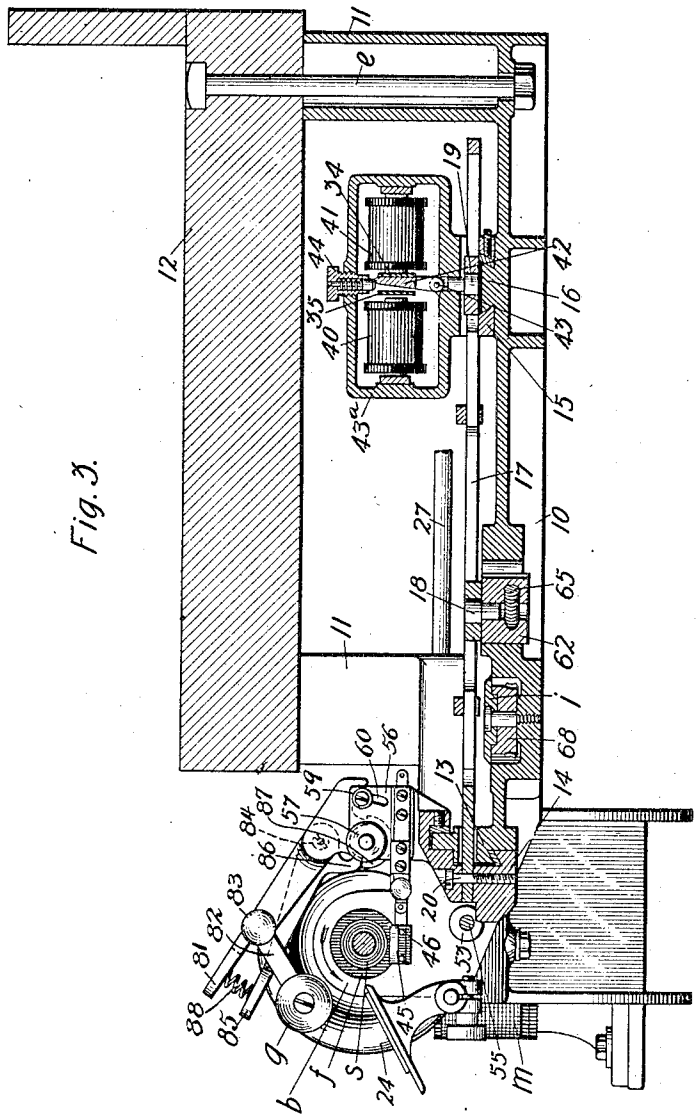
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4 SHEETS—SHEET 3.

Fig. 3.



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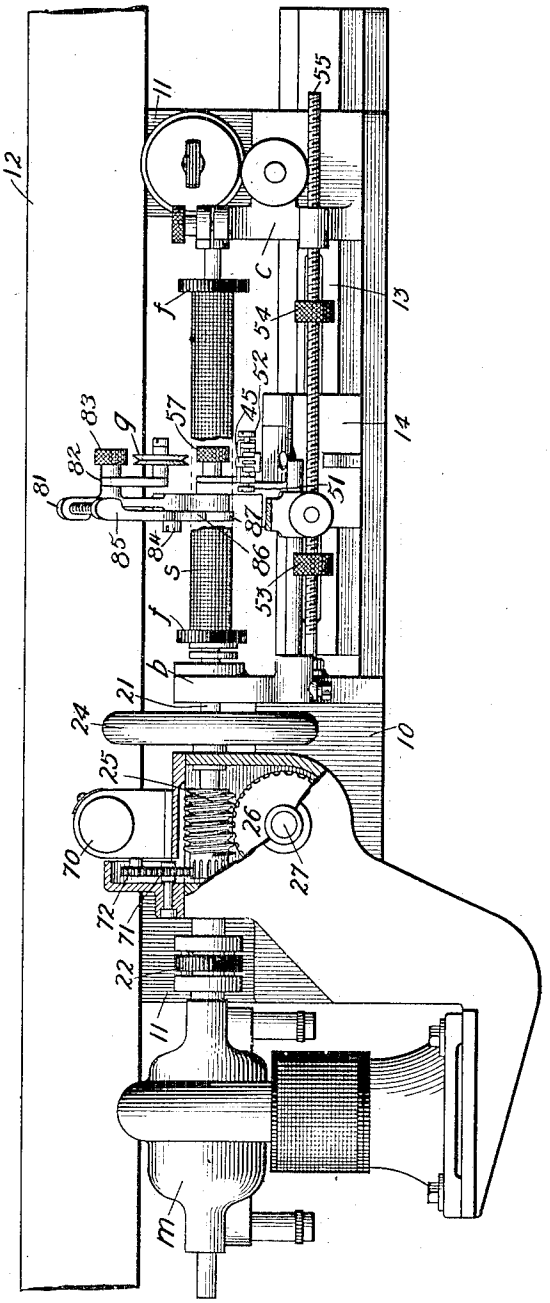


Fig. 4.

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UNITED STATES PATENT OFFICE.

ARTHUR H. ADAMS, OF BRUSSELS, BELGIUM, ASSIGNOR TO WESTERN ELECTRIC COMPANY, OF NEW YORK, N. Y., A CORPORATION OF ILLINOIS.

SEMI-AUTOMATIC WINDING-MACHINE.

1,117,620. Specification of Letters Patent. **Patented Nov. 17, 1914.**

Application filed August 29, 1912. Serial No. 717,748.

To all whom it may concern:

Be it known that I, ARTHUR H. ADAMS, a citizen of the United States, formerly of Sparkill, in the county of Rockland and State of New York, and now residing in Brussels, Belgium, have invented a certain new and useful Improvement in Semi-Automatic Winding-Machines, of which the following is a full, clear, concise, and exact description.

This invention relates to winding machines and particularly to machines adapted for winding insulated wire in uniform layers on spools.

The general object of my invention is to provide a new and improved winding machine by which the spools may be quickly and satisfactorily wound, and which can be adjusted for the winding of spools of different lengths with different sizes of wire.

My invention will be understood from the following description taken in connection with the accompanying drawings in which—

Figure 1 is a perspective view of a machine having my invention embodied therein, the table which covers certain of the parts being removed; Fig. 2 is a plan view of the machine; Fig. 3 is a sectional elevation on the line 3—3, Fig. 2; Fig. 4 is a front elevation, certain parts being broken away; Fig. 5 is a detail plan view showing the scale for indicating the size of wire for which the machine is set; Fig. 6 is a detail plan view of the circuit changing device; and Fig. 7 is a diagram of the circuit through which the magnetic clutch device is controlled.

Referring to the drawings, the major part of the mechanism of the device is mounted on a frame 10 having hollow, spacing pieces 11, and fixed to the under side of a table 12, by bolts like *e*, so that the moving parts are below table 12 leaving the upper side of the table free and clear. There is a track or runway 13, head block *b* and tail block *c;* on track 13 there runs a front carriage 14, like a tool rest, carrying the grooved guide *g* for guiding the insulated wire in helical convolutions onto the spool *s* which is to be filled with wire. Spool *s* has flanges *f*, one at each end; these are usually circular in outline as shown. There is a back carriage 15 traveling on a track 16; the two carriages 14 and 15 are mechanically united by a lever 17 oscillating on a pivot at 18; one end of lever 17 is pivoted to back carriage 15 at 19, the opposite end of lever 17 is pivoted to the front carriage 14 at 20. The front carriage 14 travels in the reverse direction with respect to the movement of the back carriage 15. The motor *m* which drives or operates the machine as shown, is an electric motor and it is connected directly to the arbor 21 by means of an insulating coupling 22. The arbor 21 supports the spool *s*, to be wound with wire. There is a hand wheel 24 on shaft or arbor 21 operated as a hand brake stopping the machine when the requisite number of turns have been put upon the spool being wound.

The main shaft or arbor 21 has fixed upon it a worm 25 gearing with a worm wheel 26, fixed on a shaft 27; upon the opposite end of shaft 27 is a gear wheel 28. This wheel 28 meshes with wheel 29 upon a short shaft 30 bearing a worm 31 meshing with a gear wheel 32 on a short vertical shaft 33 on which is fixed pulley *p*. Passing around pulley *p* is a driving belt *q* made of some fabric, like woven linen, having two parallel sections 34 and 35, moving in respectively opposite directions. This belt *q* passes around idle pulley *r* located on a movable support 36 adjustable to and fro with respect to pulley *p* by a screw operated by a thumb piece 37, by which means belt *q* may be tightened. The loose pulleys 38 and 39 are used to adjust the belt and maintain sections 34 and 35 in substantially parallel relation. Two double coil electromagnets 40 and 41 moving with the rear carriage 15 have a common armature 42, pivoted at 43; above armature 42 is a yielding, spring-pressed retaining device 44 to hold the armature in either of its two extreme positions. The retaining device 44 is carried in a frame 43^a forming part of carriage 15. The belt passes on opposite sides of armature 42, the two sections moving in opposite directions, as already explained, and when the armature 42 is attracted to one side or the other, the belt section 34 or 35 is gripped between a magnet pole and the armature, and the carriage 15 is carried along in one direction according as the belt section 34 or 35 is gripped. The electrical connections are shown in Fig. 7; it will be noticed that circuit is normally closed

through both magnets, the middle contact 45 carries a hard rubber shoe 46 and as shown in Figs. 1 and 2, shoe 46 is located in line of movement in position to engage flanges *f*.

Assuming that the carriage 14 is started from the left end of the spool, the travel is away from the left-hand flange *f* laying the turns of the wire upon the spool as it continues toward the opposite end of the coil. Assume the belt locked against the back magnet core, when the front carriage 14 reaches the right-hand end of the spool shoe 46 will strike right-hand spool flange *f* and contact 49 will be opened, breaking circuit through coils of 41, the armature 42 is drawn over to the front magnet coil 40 clutching carriage 14 to section 35 of the belt, thus reversing the movement of carriage 14 and the operation is repeated, spool shoe 46 next striking the left-hand spool flange *f*, and so on, in succession until the operator stops the machine.

The circuit-closing switch shown in Fig. 6 has two stiff springs 47 and 48, and two light spring contacts 49 and 50; there are two fixed contacts 51 and 52; each has a hard rubber contact point 80 projecting through a perforation in the contact 49 or 50, and engaging contact 47 or 48 so that when contact 45 is moved in one direction, contact 45 separates from contact 49, and when moved in the other direction, contact 45 separates from contact 50. The shoe 46 is shaped for use with round heads or flanges *f*. In case square heads or flanges are employed on the spools to be wound, use is made of the round thumb nuts 53 and 54 on the fixed screw rod 55. The space between the inside faces of nuts 53 and 54 is made equal to the winding space upon the coil. The contact springs shown in Fig. 6 are carried upon an adjustable L-shaped bracket 56, pivoted at 57 to an upright 58 of the frame.

A locking screw 59 projecting through a slot 60 in the bracket 56 into the upright 58 serves to hold the bracket 56 and the contact springs carried thereby in any desired position. By loosening the locking screw 59, the shoe 46 may be positioned to engage the heads of any size of spool for which the machine is supposed to operate, or in case square or irregular shape headed spools are to be wound, lowered to engage the nuts 53 and 54. The shoe 46 engaging the nuts 53 and 54 causes the reversals in the movement of the winding mechanism in exactly the same manner as when the shoe 46 engages the spool heads.

The guide roller *g* is suspended from a guide lever 81 by a connecting arm 82. The arm 82 is pivoted to the lever 81 on a knurled headed tension adjusting screw 83. In the various drawings the guide *g* is shown in the position assumed when a spool is being wound, but it may be raised and thrown back from in front of the spool when the winding operation is completed and it is desired to remove the spool from the machine. Pivoted to the guide lever 81 at 84 is a latching lever 85. This lever 85 is provided with a pawl 86, which is adapted to engage either of two notches in a stop disk 87. One of these notches is positioned to hold the guide *g* in operative position and the other in the non-operative position. The pawl 86 is normally held in engaging position by a spring 88 located between the guide lever 81 and the latching lever 85. By pressing the outer ends of levers 81 and 85 together, against the tension of spring 88, the pawl 86 may be withdrawn from the notch in disk 87 and the guide *g* moved about the pivot 84 to the other position.

In adjusting the speed of front carriage 14, and to determine the proper pitch at which various kinds and sizes of wire are to be wound, the operator measures with a micrometer the outside diameter of the wire, and then directs attention to dial or indicator *i* graduated to thousandths of an inch. The arm 17, uniting the two carriages 14 and 15 is on a pivot 18; the arm 17 is slotted and pivot 18 extends through the slot. Pivot 18 is supported on a nut 62, slidable in a slot 63 in the fixed bed 64. Nut 62 travels on screw 65, said screw terminating in the knurled circular thumb piece 66. On the same screw 65 is a worm 67 meshing with a worm wheel 68 on which is fixed a plate having thereon graduated scales 69 and 73. The zero point for scale 69 is shown at 75, and the zero point for scale 73 at 76. The gears 28 and 29 are of different sizes and are interchangeable on the shafts 27 and 30. When said gears are arranged as shown, one of the scales 69 or 73 is used; and when said gears are interchanged the other of said scales is employed. When the gears 28 and 29 are arranged on the shafts 27 and 30 as shown, for example, if the machine is to be set to wind wire having a diameter .0035 of an inch, the thumb piece 66 is turned until the figures .0035 on the scale 69 are opposite the zero point 75. And if the diameter of the wire had been .009, the gears 28 and 29 would have been interchanged on the shafts 27 and 30, and the front piece 66 would have been turned until the figure .009 on the scale 73 was opposite the zero point 76; it being understood that the nut 62 is always in the same position when the gears 28 and 29 are changed. With the arrangement just described, it is obvious that the necessity for having a large number of interchangeable gears between the shafts 27 and 30 is avoided, without requiring that the nut 62 be adjusted over too long a path. There is a winding gage 70 operated by the main shaft 21, through gears 71 and 72; this is reset for each spool to be wound and

indicates the number of turns put on any spool.

What I claim is:

1. In a winding machine the combination of a power-driven rotating device, a spool connected therewith, a wire guide and means for moving the guide to and fro consisting of a power-driven endless belt having oppositely moving sections in proximity, and an electromagnetic device for connecting the guide with first one section and then the other.

2. In a winding machine the combination of a power-driven rotating device, a spool connected therewith, a wire guide, and means for moving the guide to and fro, consisting of a power-driven endless belt having oppositely moving sections in proximity; and a device including a pivoted lever and an electromagnet for connecting the guide with first one section and then the other.

3. In a winding machine the combination of a power-driven rotating device; a spool connected therewith; a wire guide; and means for moving the guide to and fro, consisting of a power-driven endless belt having oppositely moving sections in proximity, and a device including a pivoted lever and an electromagnet for connecting the guide with first one section and then the other of said belt; and a moving circuit changer for said magnet in position to engage movement limiting and reversing stops.

4. In a winding machine the combination of a power-driven rotating device, a spool connected therewith, a wire guide, and means for moving the guide to and fro, consisting of a power-driven endless belt having oppositely moving sections in proximity, a device including a pivoted lever for connecting the guide with first one section then the other, and means for moving the pivotal point of support of said lever to vary the rate of movement of the guide.

5. In a winding machine the combination of a power-driven rotating device, a spool connected therewith, a wire guide, and means for moving the guide to and fro, consisting of a power-driven endless belt having oppositely moving sections in proximity, a device including a pivoted lever for connecting the guide with first one section then the other, and means for moving the pivotal point of support of said lever comprising a slidable nut upon which said lever is pivoted.

6. In a winding machine the combination of a rotating spool carrying device, a wire guide, means for moving the guide to and fro comprising an endless belt having oppositely moving sections in proximity, a clutch coöperating therewith, a pivoted lever for connecting the guide and clutch, means for moving the pivotal point of support of said lever comprising a movable nut upon which said lever is pivoted, means for moving said nut, and a graduated scale for indicating the position of said nut.

7. A winding machine comprising a rotating device, a spool connected therewith, a wire guide, a movable carriage, an adjustably pivoted lever for communicating motion from said carriage to said guide, a driving member having oppositely moving sections in proximity for imparting motion to said carriage, and electromagnetic means for coöperating with said carriage and said driving member to control the movement of said carriage and said guide.

In witness whereof, I hereunto subscribe my name this 19th day of August A. D. 1912.

ARTHUR H. ADAMS.

Witnesses:

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G. DE LEROY.