Aug. 20, 1935. E. L. WILDY 2,012,208

WINDING MACHINE FOR FILAMENTS

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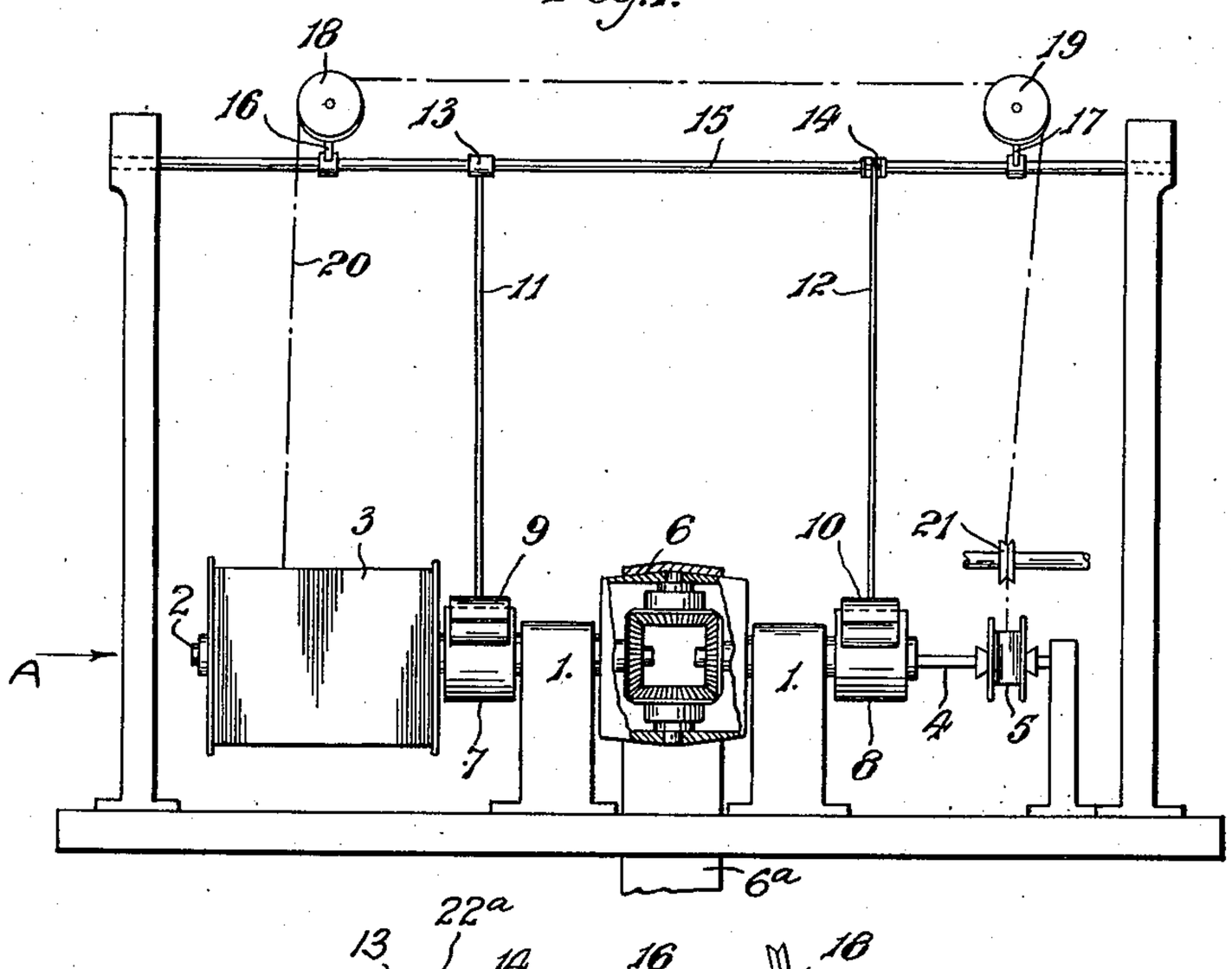
Fig. 1.



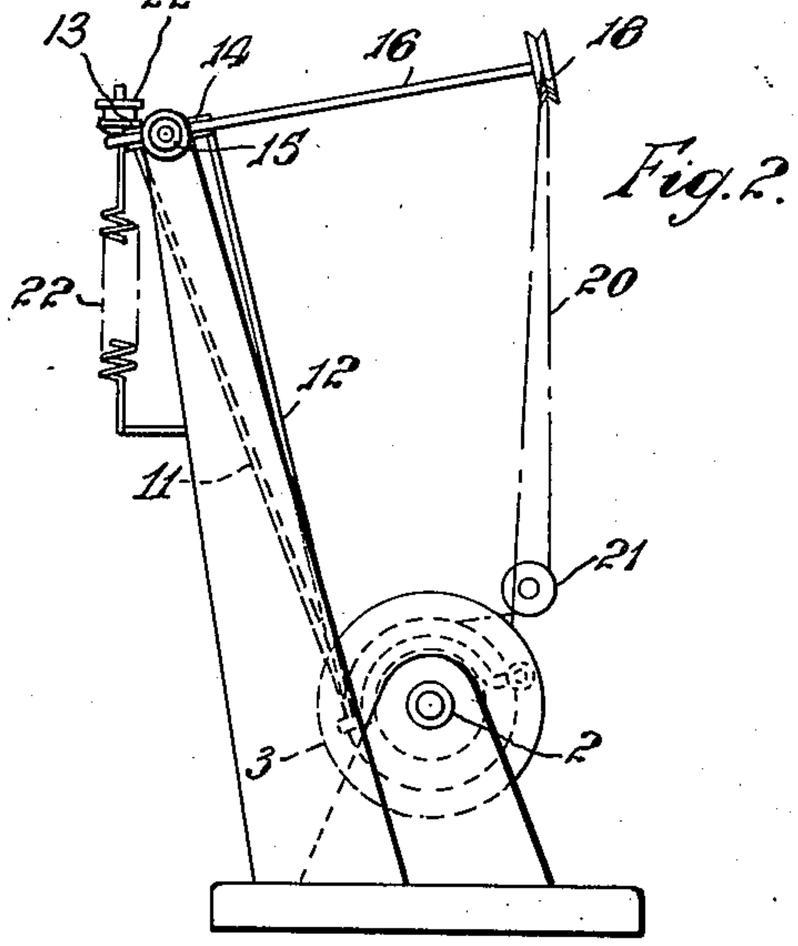


Fig. 2.

INVENTOR
E. L. WILDY.
By Blair & Kilcoyne.
ATTYS.

Aug. 20, 1935. E. L. WILDY 2,012,208

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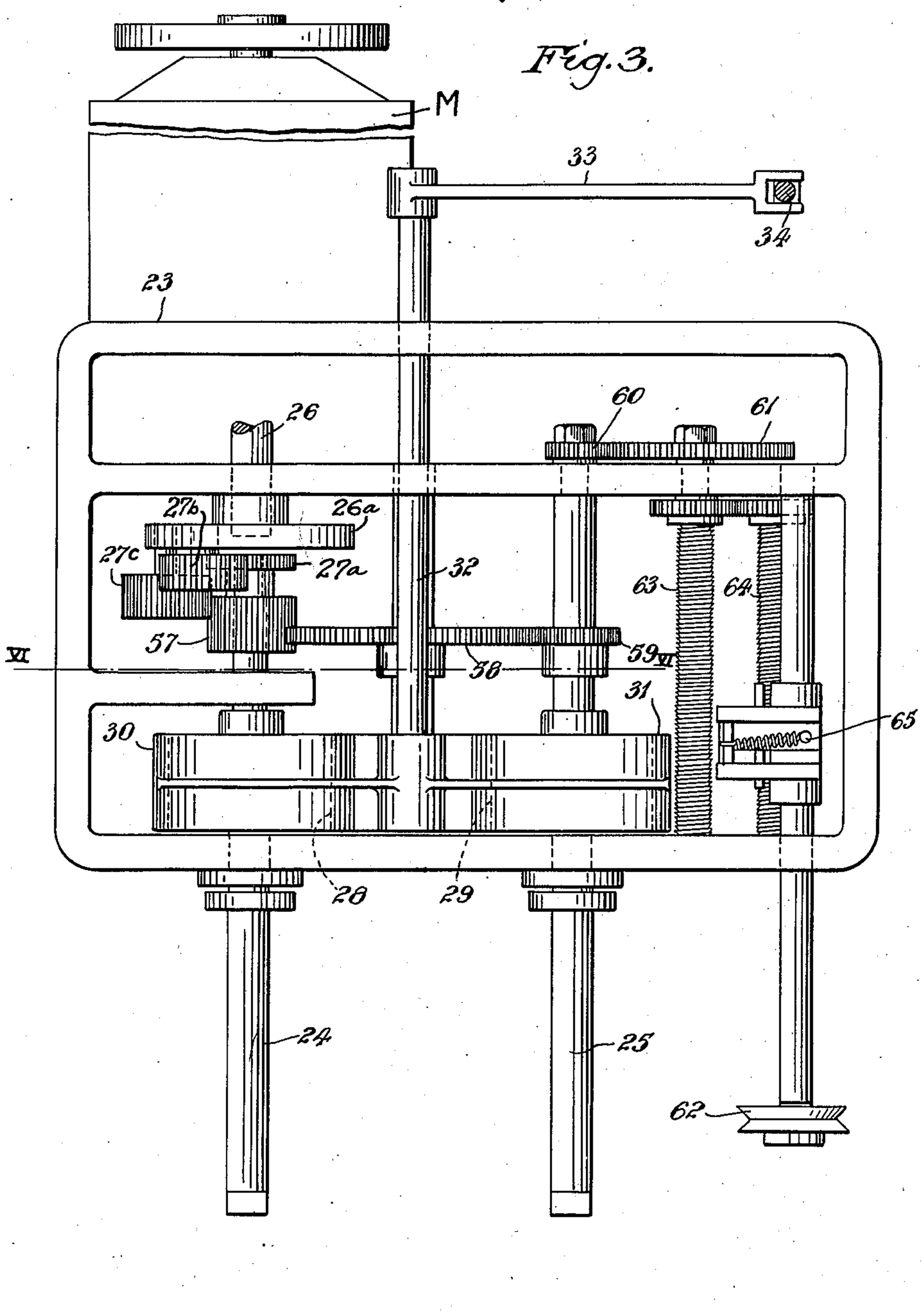
Fig. 3.



INVENTOR
E. L. WILDY.
By Blair & Kilcoyne
ATTYS.

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WINDING MACHINE FOR FILAMENTS

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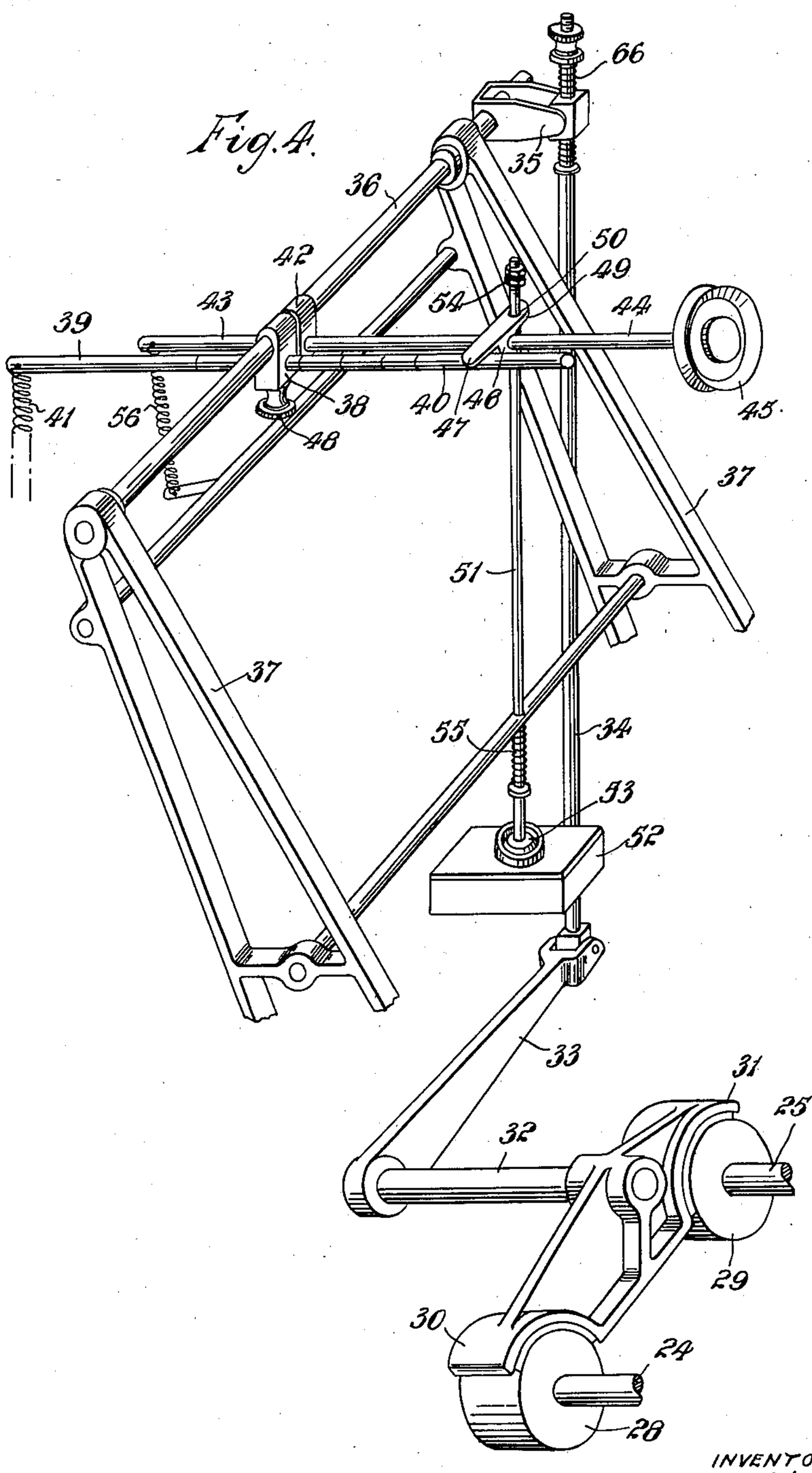
Fig. 4.



INVENTOR
E. L. WILDY.
By Blair Kilcoyne.
ATTYS.

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Fig. 5.

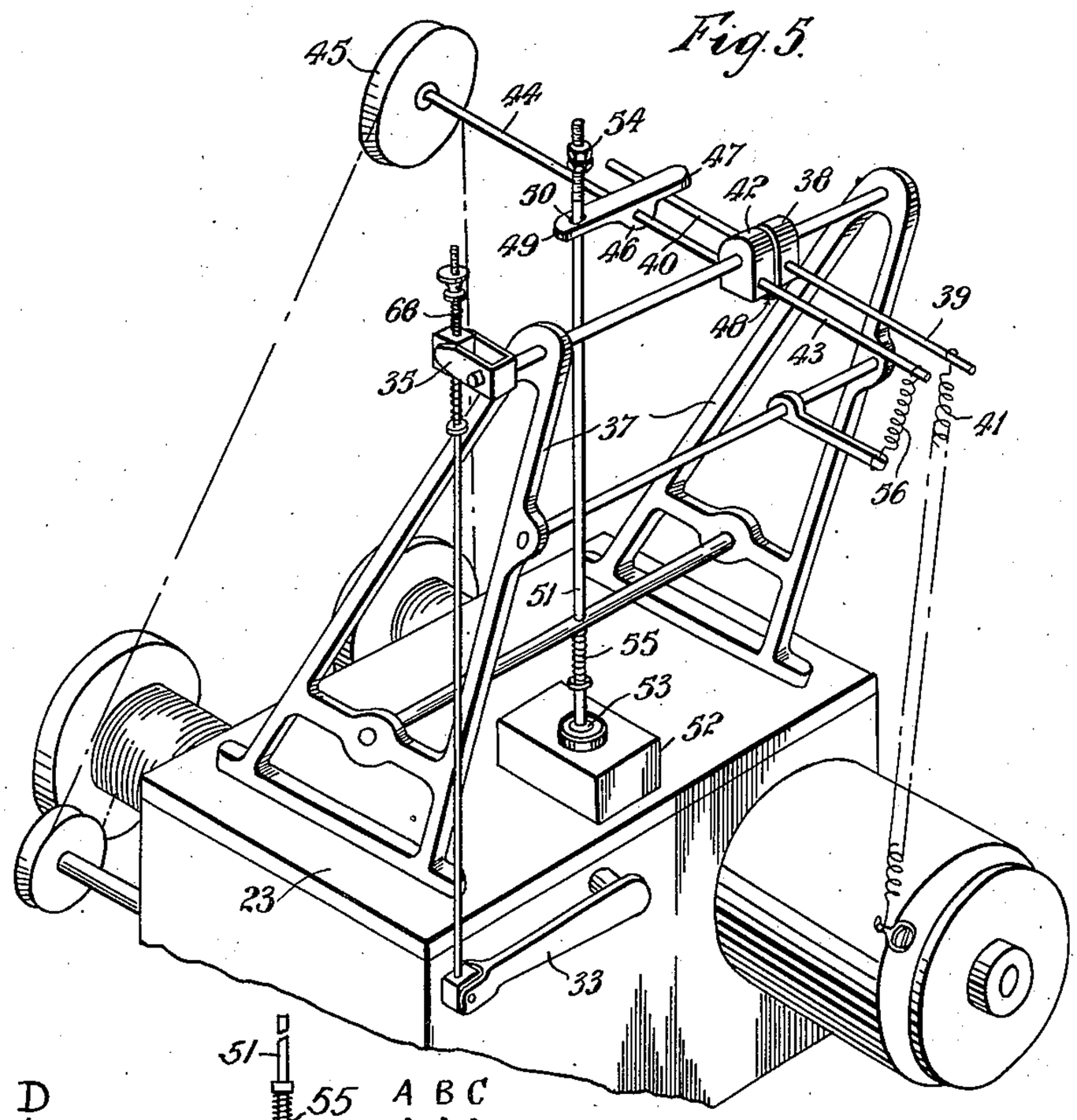
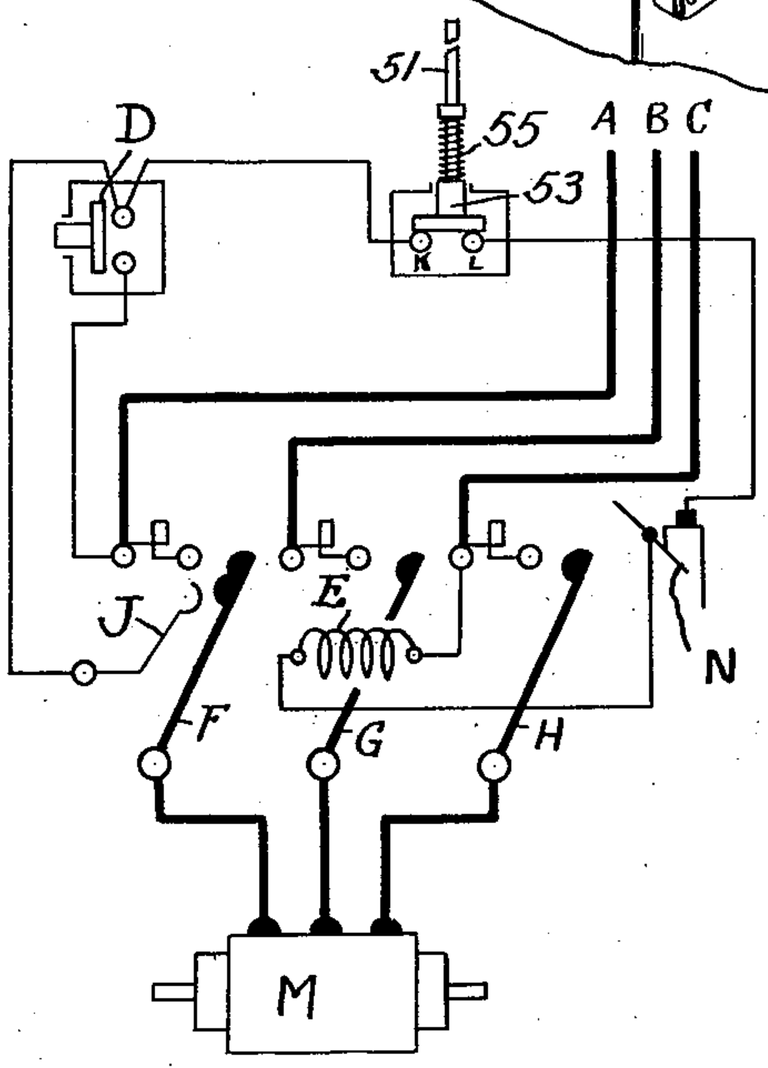


Fig. 9.



INVENTOR

ERIC L WILDY

BY

Blair & Kilcoyne

ATTORNEYS

Aug. 20, 1935. E. L. WILDY 2,012,208

WINDING MACHINE FOR FILAMENTS

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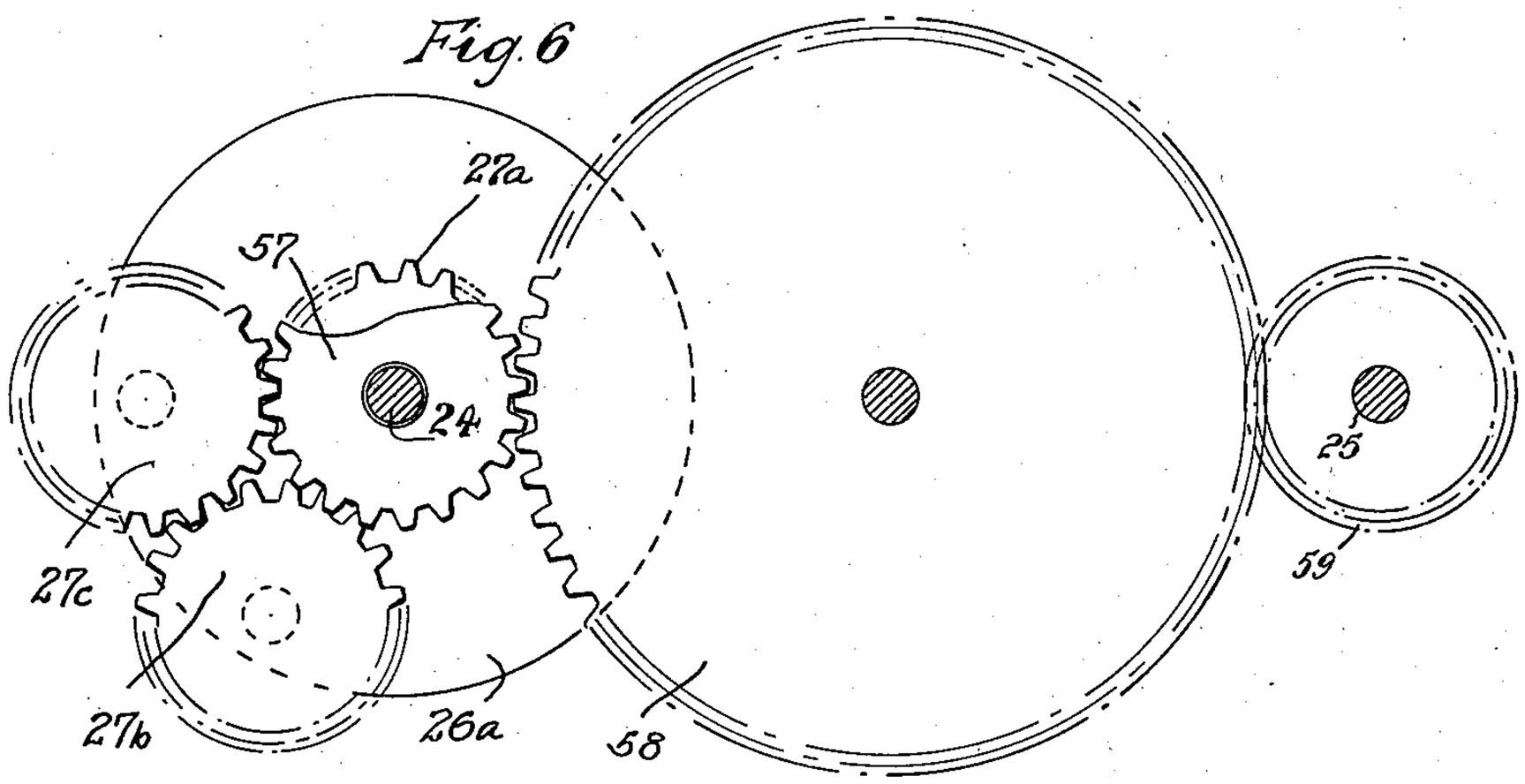
Fig. 6



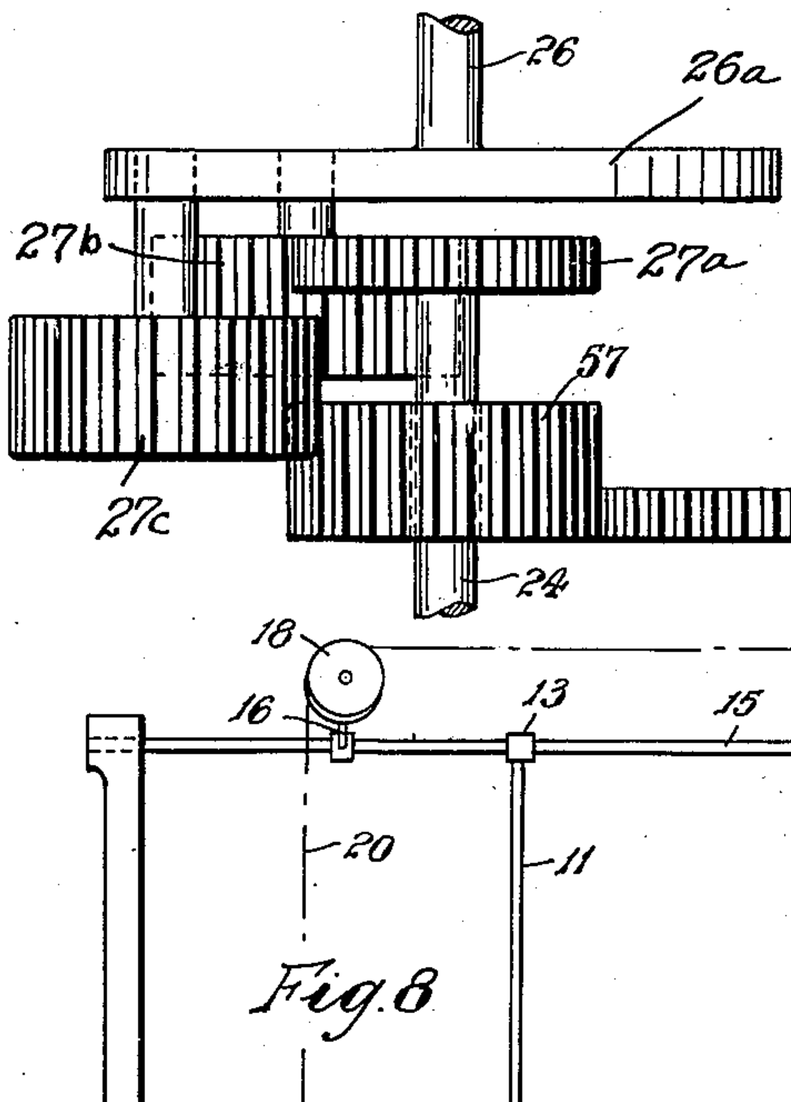


Fig. 7.

Fig. 8

INVENTOR
ERIC L WILDY
BY
Blair & Kilcoyne
ATTORNEYS

Patented Aug. 20, 1935 2,012,208

UNITED STATES PATENT OFFICE

2,012,208

WINDING MACHINE FOR FILAMENTS

Eric Lawrence Wildy, London, England, assignor to The London Electric Wire Company and Smiths Limited, London, England, a corporation of Great Britain

Application July 6, 1934, Serial No. 734,026
In Great Britain July 12, 1933

12 Claims. (Cl. 242—45)

This invention relates to machines for winding filaments and more particularly to machines for winding wire.

When winding wire from one bobbin to another, the external diameters formed by the winding on the bobbins vary as the amount of wire on the two bobbins increases and decreases respectively. It is necessary therefore to control the relative speeds of rotation of the bobbins in such a way that the speed of rotation of the bobbin having the smaller external diameter of winding is correspondingly greater than that of the bobbin with the larger external diameter of winding, and that the proper relation between these speeds is constantly maintained in order, on the one hand, that there shall be no slackness in the wire, and on the other hand that the tension in the wire shall not become excessive but shall remain as uniform as possible.

The object of the invention is to provide a machine for winding filaments in which the relative speeds of rotation of the bobbins are continuously and automatically controlled.

The term "bobbin" used throughout this specification is intended to be interpreted in its broadest sense to include formers, reels, etc.

According to the invention, a machine for winding filaments comprises two spindles for the reception of unwinding and winding bobbins respectively connected with each other through a differential mechanism in association with means actuated by the tension of the filament being wound from one bobbin to another for retarding the speed of rotation of the spindles in such a manner that the speeds of rotation of the two spindles are continuously controlled.

The machine may be driven in any convenient manner; for example, the differential mechanism may be housed within a driving pulley, or a driving shaft may drive the two spindles carrying the bobbins through the differential mechanism or any other convenient type of drive may be used.

Although the more general mechanical forms of differential mechanism are most commonly utilized according to the present invention, other forms of differential mechanism will also serve. For example, an alternating current field motor with its "rotor" attached to a spindle for the reception of one bobbin, and its "stator" attached to a spindle for the reception of another bobbin may be used. Both the "rotor" and "stator" of the motor are adapted and arranged in such a manner that they are both free to rotate. The electrical current to the "stator" may be supplied through the agency of suitable slip ring and brush gear. The braking mechanism associated with the two spindles is similar in all respects to that utilized in connection with the embodiments hereinafter described.

Preferably the means for retarding the speed of rotation of one or other of the bobbin spindles as desired comprises two interconnected brakes, one to operate on each bobbin spindle and arranged in such a manner that, as the external diameter of winding on the unwinding bobbin decreases and the external diameter of the winding on the winding bobbin increases, the tension of the wire being wound from one bobbin to another tends to increase, that is to say, the bobbin which is winding the wire tends to run at too great a speed, one of said brakes is applied to the spindle carrying the winding bobbin whilst the other brake is relieved, with the result that the speed of rotation of the spindle carrying the winding bobbin is reduced and simultaneously through the action of the differential mechanism the speed of rotation of the spindle carrying the unwinding bobbin is increased.

Two embodiments of an apparatus embodying the invention are hereinafter described and shown in the accompanying drawings, wherein:—

Fig. 1 is a diagrammatic front elevation,

Fig. 2 is a side elevation looking in the direction of the arrow "A",

Fig. 3 is a plan view of a further example clearly showing the differential mechanism together with part of the brake mechanism, and

Fig. 4 is a perspective view clearly showing the operation of the brake mechanism.

Fig. 5 is a perspective view of the complete machine from behind,

Fig. 6 is a sectional view taken along line VI—VI of Fig. 3, clearly showing the relative disposition of certain parts of the differential mechanism,

Fig. 7 is a plan view of certain parts as shown in Fig. 6,

Fig. 8 is a view similar to Fig. 1 but which incorporates an electrical alternating current field motor.

Fig. 9 shows the electrical circuit of the motor which drives certain portions of the mechanism.

Referring first to Figs. 1 and 2 of the drawings:—The frame 1 supports a shaft 2 which carries an unwinding bobbin 3 and a shaft 4 carrying a winding bobbin 5, which is shown in the drawings as a former for a coil winding. The shafts 2 and 4 are connected with each other through a differential mechanism 6. The machine is driven through the agency of a belt 6*a*.

On the shafts 2 and 4 are two brake drums 7 and 8 which are acted on by brakes 9 and 10, which are connected to and operate through rods 11 and 12 to levers 13 and 14 mounted on a fulcrum rod 15 which is supported by the framework 1 (see Fig. 2). The rod 12 is attached to the lever 14 which is mounted in front of the fulcrum rod 15 and the rod 11 is attached to the lever 13 which is mounted behind the fulcrum rod 15.

Rigidly connected to the fulcrum rod **15** are two arms **16** and **17** which are adjustable with regard to length, having at their extremities two pulley wheels **18** and **19**. The wire **20** (shown in dot and pick lines) from the unwinding bobbin **3** passes over the pulley wheels **18** and **19** over a spreader member **21** and on to the winding bobbin **5**.

It will be seen with reference to Fig. 2 that if the arms **16** and **17** move upwardly, the brake **9** is applied to the drum **7** and the arrangement is such that the brake **10** is relieved. In the same manner, if the arms **16** and **17** are moved in a downward direction, the brake **10** is applied to the drum **8** and the brake **9** is relieved.

The operation of the machine is as follows:—

The wire **20** from the unwinding bobbin **3** is passed over the pulley wheels **18** and **19** and the spreader **21**, and its free end fixed to the winding bobbin **5**. The wire **20** being slack, the arms **16** and **17** have moved upwardly under the action of a spring **22** (see Fig. 2) adjustable by a knurled nut **22***a* so that the brake **9** is applied to the drum **7**. The tension spring is initially adjusted to suit the type of wire being wound and may be adjusted to suit the weight of the respective bobbins.

Motion is imparted to the differential mechanism **6** by a belt **6***a* and tends to rotate the shafts **2** and **4**. The shaft **4** rotates freely but the brake mechanism **9**, **7**, is tending to retard the rotation of the shaft **2**. As the shaft **4** rotates the tension in the wire **20** increases to such an extent that the arms **16** and **17** are drawn downwardly, relieving the pressure of the brake **9** on the drum **7**.

As the external diameter of the winding on the bobbin **5** is less than that on the bobbin **3**, the wire would tend to become slack owing to the bobbin **3** unwinding the wire **20** at too great a speed. This tendency is corrected by the arms **16** and **17** rising with any decrease in wire tension, causing the brake mechanism **9**, **7**, to retard the speed of rotation of the spindle **2** and simultaneously through the action of the differential mechanism **6** the speed of rotation of the shaft **4** is increased.

As the external diameter of the winding on the bobbin **5** increases, with a consequent tendency for the wire tension to increase, the arms **16** and **17** move slightly in a downward direction, and the brake mechanism **10**, **8**, retards the motion of the shaft **4**, and simultaneously through the action of the differential mechanism **6** the speed of rotation of the shaft **2** carrying the unwinding bobbin **3** is increased.

Referring now to Figs. 3 and 4 of the drawings, a casing **23** carries a spindle **24** adapted to receive an unwinding bobbin (not shown), and a spindle **25** adapted to receive a winding bobbin (not shown). The spindles **24** and **25** are connected together to a driving shaft **26** through a spur-gear differential mechanism constituted by the plate **26***a*, the wheels **27***a*, **27***b*, **27***c*, **57**, **58** and **59**. The operation of this differential mechanism is hereinafter more fully described. The shaft **26** is driven by a motor "M".

On the spindles **24** and **25** respectively within the casing **23** are two brake drums **28** and **29**, which are arranged to be acted upon by brake shoes **30** and **31**. As will readily be seen from the drawings, the brake shoes **30** and **31** are of unit construction and are rigidly mounted upon one end of a shaft **32** so that a partial rotation of the shaft **32** applies either the brake shoe **30** on the brake drum **28** or the brake shoe **31** on the brake drum **29**, depending upon the direction of rotation of the spindle **32**.

One end of an arm **33** is pivotally attached to the other end of the shaft **32** and is arranged in such a manner that an upward movement of the arm **33** causes the brake shoe **30** to act upon the brake drum **28**, whilst a downward movement causes the brake shoe **31** to act upon the brake drum **29**.

Pivotally attached to the other end of the arm **33** is the lower end of a rod **34**, the upper end of which is pivotally attached to one end of a short arm **35**, the other end of which is rigidly mounted on a fulcrum rod **36**. The fulcrum rod **36** is carried on a frame work **37** which is held positioned on the lid of the casing **23** (see more particularly Fig. 5).

Rigidly mounted on the fulcrum rod **36** is a block **38** in which a lever **39**, **40**, is held, a movement of which either upwardly or downwardly partially rotates the fulcrum rod **36**, which in turn moves the rod **34** and the lever **33** to operate the brake mechanism in the manner hereinbefore described.

A spring **41** normally tends to pull the arm **40** of the lever **39**, **40**, upwardly; that is to say, to the position in which the brake shoe **30** is applied to the brake drum **28**, which will tend to retard the rotation of the spindle **24**.

Loosely mounted on the fulcrum rod **36** is a block **42** which carries a lever **43**, **44**, the arm **44** of which is provided at its end with a pulley **45**, over which the wire being wound from one bobbin to another passes.

The depending limb **46** of a T-shaped member is fixed on the arm **44** of the lever **43**, **44**, one arm **47** of the T-shaped member being adapted to engage the arm **40** of the lever **39**, **40**, when the arm **44** is pulled or moved in a downward direction to operate the brake mechanism.

The effective length of the arm **40** of the lever **39**, **40**, and consequently the point of engagement of the arm **47** of the T-shaped member, can be adjusted by sliding the lever in the block **38**, screw adjusting means **48** being provided for this purpose.

The other arm **49** of the T-shaped member is provided with an aperture **50** so that it can ride loosely over a rod **51**.

The circuit of an electric motor which imparts motion to the driving shaft **26** is connected through a stop control mechanism **52** which operates in such a manner that when a button **53** is momentarily raised, the circuit to the motor is broken and thus the machine is stopped.

This circuit (see Fig. 9) operates as follows:

Three-phase A. C. current is supplied from the mains A, B, C, as indicated.

On depressing the push-button of the starting switch D the circuit A, C, is completed, the solenoid E is energized and the 3-pole switch, F, G, H, is closed by the action of this solenoid.

In closing the arm F of the 3-pole switch also makes contact with a secondary switch J, which serves to keep the solenoid circuit closed when pressure is removed from the starting button D, so that pressure on the switch D need only be momentary. The motor M will now be in operation by virtue of current from the three-phase A. C. main, and will continue to run until the breaking of the wire causes the arm **51** to lift the button **53** momentarily against the action of the spring **55**, thus breaking the solenoid circuit at the points K and L, when the solenoid becomes de-

energized and allows the switch arms F, G and H to return to the position shown in the drawings. Overloading of the motor circuit is guarded against by the inclusion of a thermal switch of any suitable type, as indicated at N.

The specific circuit herein described forms no part of the instant invention except in so far as it enters into the combination shown, and is merely illustrative of a suitable circuit for use with this apparatus.

The lower end of the rod **51** is attached to the button **53**, and its upper end is provided with an adjustable abutment **54**.

When the arm **49** of the T-shaped member rises and strikes the abutment **54** the rod **51** rises, thus lifting the button **53** to break the circuit. When the arm **49** of the T-shaped member is moved away from the abutment **54** a spring **55** returns the rod **51** to its normal position.

A spring **56** is arranged so as to cause the arm **44** of the lever **43**, **44**, and thus the arm **49** of the T-shaped member to strike the abutment **54** immediately the load on the pulley **45** is relieved, that is to say, whenever for any reason there is no wire passing over the pulley **45**.

The spindles **24** and **25** are connected to each other through the gears **27***a*, **27***b*, **27***c*, **57**, **58**, **59**, constituting part of the differential mechanism **27**. The spreader mechanism of any suitable known construction is connected to the spindle **25** through gears **60**, **61**. Briefly, the spreader mechanism is of a known type, comprising two threaded members **63** and **64** upon which a carriage member **65** travels. The arrangement is such that when the carriage member **65** reaches the end of its travel on either of the threaded members **63**, **64**, it is automatically returned on the thread of the other threaded member in any suitable conventional manner. It will be seen from the drawings that the speed of the winding spindle **25** and in addition the spreader mechanism maintains a constant pitch. It will be understood that the spreader mechanism may be associated with any of the necessary devices utilized in connection with coil winding. The spreader mechanism is provided with a pulley **62** over which the wire which is being wound passes.

A spring means **66** serves for adjusting the brake mechanism.

As hereinbefore stated, the spindles **24** and **25** are connected together to a driving shaft **26** which is itself driven by means of the motor "M" through a spur-gear differential mechanism **27**. This differential mechanism **27** is illustrated diagrammatically in Figs. 6 and 7 and comprises wheels "A", "B", "C", "D" and "E", the wheel "E" representing the wheel **58** and the wheel "B" representing the wheel **57** as shown in Fig. 4 of the drawings.

It will be seen from Figs. 6 and 7 that the wheel "A" is formed integrally with the spindle **24**, the wheel "B" is loosely mounted thereon so as to be capable of rotation independently of the spindle **24**. This wheel is also in mesh with the wheel "E". The wheel "B" is in mesh with the wheel "C" which itself is in mesh with the wheel "D" which in turn is in mesh with the wheel "A". The wheels "C" and "D" are carried by the circular plate "F" but are capable of rotating freely about their own axes.

The operation of the differential mechanism is as follows:—

Motion is transmitted by the shaft **26** causing the circular plate "F" to rotate.

Should there be no force tending to retard the speed of rotation of either of the spindles **24** and **25** then the shaft **26** will transmit its motion equally to the wheel "A", that is, to the spindle **24**, to the wheel "E", the wheel **59**, and consequently the spindle **25**.

Now when the shaft **26** rotates it carries the circular plate **26***a* and with it the wheels **27***b* and **27***c*. The wheel **27***b* being in mesh with the wheel **27***a* causes the wheel **27***a* to rotate with the same speed of rotation, that is to say, with the same speed of rotation as the shaft **26**, since wheels **27***b* and **27***c* do not rotate independently on their own axes but rotate with the circular plate **26***a*. The wheel **27***c* being in mesh with the wheel **57** causes the wheel **57** to rotate and through the wheel **58**, the wheel **59**, that is to say, the spindle **25**, and the arrangement in the size of gears is such that the speed of rotation of the wheel **59** is the same as the wheel **27***a*.

Now should the spindle **24** be held completely against rotation, the wheel "D" rotating on its own axis will roll around the wheel "A" but the wheel "C" will transmit its motion through the wheel "B", which is free to rotate on the now stationary spindle **24**, through the wheel "E" to the wheel **59**, resulting in this wheel rotating at twice the speed of the shaft **26**.

Should the spindle **25** be held against rotation, then the wheels **59**, "E" and "B" will remain stationary. The wheel "C" now rotates on its own axis and merely rolls around the wheel "B" but the wheel "D", also rotating on its own axis and meshing with the wheel "A", causes it, and therefore the spindle **24**, to rotate at twice the speed of rotation of the shaft **26**. It will be seen, therefore, that when only a partial retardation is effected, in the speed of rotation of one of the spindles **24** and **25**, through the action of the differential mechanism there is an increase in the speed of rotation of the other spindle—that is to say, the spindle which is not retarded.

The operation of the machine is as follows:—The wire from the unwinding bobbin which is on the spindle **24** is passed over the pulley wheel **45**, the spreader pulley **62** and on to the winding bobbin which is situated on the spindle **25**, where its free end is fixed. The wire being slack, no movement has taken place of the lever **43**, **44**, so that the brake shoe **30** is still acting upon the brake drum **28**, and so tending to retard the speed of rotation of the spindle **24**. As soon as the shaft **26** commences to rotate the spindle **24** is held momentarily by the action of the brake shoe **30** on the brake drum **28** against motion, but the spindle **25** commences to rotate, gradually increasing the tension in the wire, causing the pulley **45** to be pulled downwardly so that the arm **47** of the T-shaped member engages with the arm **40** of the lever **39**, **40**, and pulls it slightly downwardly, which also through the agency of the rod **34** moves the arm **33** downwardly, thus partially relieving the pressure of the brake shoe **30** on the brake drum **28**, so that the spindle **24** commences to rotate.

Now should the tension in the wire tend to increase during the winding from one bobbin to another, the pulley **45** will be pulled downwardly, causing the brake shoe **31** to act upon the brake drum **29** to retard the speed of rotation of the spindle **25** when through the action of the differential mechanism **27** the speed of rotation of the spindle **24** increases.

Should the tension in the wire tend to de-

crease, then the pulley **45** rises under the action of the spring **56** causing the arm **33** to be moved upwardly and through the agency of the brake mechanism the speed of rotation of the spindle **24** is retarded when through the action of the differential mechanism **27** the speed of rotation of the spindle **25** increases.

When a winding operation is completed, that is to say, when there is no more wire on the unwinding bobbin, or should the wire break during winding, the pulley **45** relieved of its load moves upwardly under the action of the spring **56** and the arm **49** of the T-shaped member strikes the abutment **54**, causing the electric circuit to be broken and stopping the driving motor.

Fig. 8 shows diagrammatically an arrangement similar to Figs. 1 and 2 but in which the differential mechanism **6** shown in Fig. 1 is replaced by an electric alternating current field motor, the "rotor" **67** of which is formed integrally with the shaft **4** which carries the winding bobbin **5**. The "stator" **68** is formed integrally with the shaft **2** which carries the unwinding bobbin **3**. Electric current is supplied to the motor constituted by the "rotor" **67** and "stator" **68** through the agency of suitable slip-ring and brush-gear **69**.

The operation of the machine is similar in all other respects to that shown in Figs. 1 and 2.

It will be seen that the winding machine for wire or similar material according to the invention so continuously adjusts the relative speeds of rotation of the unwinding and winding bobbins respectively that the tension in the wire which is being wound is kept as uniform as possible, and in starting or stopping the machine the speed of rotation of the bobbins changes relatively by virtue of the differential mechanism associated with the hereinbefore described means for retarding the speed of rotation of either of the spindles carrying the bobbins, thus preventing any overrun or tightening of the wire being wound.

It will be understood that the winding machine for wire herein-described is also applicable to textile yarns and filaments of all descriptions.

What is claimed is:—

1. In a machine for winding filaments, the combination with two spindles for the reception of bobbins, one from which filament is to be unwound, and the other on which filament is to be wound, a differential mechanism, driving means for said spindles, said spindles being connected with each other and to the driving means through said differential mechanism, of a brake cooperating with one of said spindles, a second brake cooperating with the other spindle, means actuated by the tension of the filament which is being wound from one of said bobbins to the other, said means being adapted to control both the two said brakes so as to apply the one whilst the other is relieved.

2. In a machine for winding filaments, the combination with two spindles for the reception of bobbins, one from which filament is to be unwound, and the other on which filament is to be wound, a differential mechanism, driving means for said spindles, said spindles being connected with each other and to the driving means through said differential mechanism, of brake drums and interconnected brake shoes, said brake drums being provided one on each of the said two spindles, said brake shoes being actuated by the tension of the filament which is being wound from one bobbin to another, one of said brake shoes being arranged to be applied to one of said drums for retarding the speed of rotation of one of the said spindles, whilst the other brake is relieved, allowing the speed of rotation of the other of the said spindles to accelerate.

3. In a machine for winding filaments, the combination with two spindles for the reception of bobbins one from which filament is to be unwound and the other on which filament is to be wound, a differential mechanism, driving means for said spindles, said spindles being connected with each other, and to the driving means, through said differential mechanism, of brake drums and interconnected brake shoes, said brake drums being provided one on each of said spindles, a pulley over which the filament which is being wound from one bobbin to another passes, said pulley being connected to and operating said interconnected brake shoes, said brake shoes being actuated by the tension of the filament which is being wound from one bobbin to another, a downward movement of the said pulley causing one of said brake shoes to be applied to one of said brake drums to retard the speed of rotation of one of the spindles and an upward movement of said pulley causing the other of said brake shoes to be applied to the other of said brake drums to retard the speed of rotation of the other of said spindles.

4. In a machine for winding filaments, the combination with two spindles for the reception of bobbins, one from which filament is to be unwound and the other on which filament is to be wound, a "stator" and a "rotor" of an electrical alternating current field motor, one of said spindles being connected to the "stator" and the other of said spindles to the "rotor", of a brake cooperating with one of said spindles, a second brake cooperating with the other spindle, means actuated by the tension of the filament which is being wound from one of said bobbins to the other, said means being adapted to control both the two said brakes so as to apply the one whilst the other is relieved.

5. In a machine for winding filaments, the combination with two spindles for the reception of bobbins, one from which filament is to be unwound, and the other on which filament is to be wound, a "stator" and a "rotor" of an electrical alternating current field motor, one of said spindles being connected to the "stator" and the other of said spindles to the "rotor", of brake drums and interconnected brake shoes, said brake drums being provided one on each of the said two spindles, said brake shoes being actuated by the tension of the filament which is being wound from one bobbin to another, one of said brake shoes being arranged to be applied to one of said drums for retarding the speed of rotation of one of the said spindles, whilst the other brake is relieved, allowing the speed of rotation of the other of the said spindles to accelerate.

6. In a machine for winding filaments, the combination with two spindles for the reception of bobbins, one from which filament is to be unwound and the other on which filament is to be wound, a "stator" and a "rotor" of an electrical alternating current field motor, one of said spindles being connected to the "stator" and the other of said spindles to the "rotor", of brake drums and interconnected brake shoes, said brake drums being provided one on each of said spindles, a pulley over which the filament which is being wound from one bobbin to another passes, said pulley being connected to and operating said interconnected brake shoes, said brake shoes being actuated by the tension of the fila-

ment which is being wound from one bobbin to another, a downward movement of the said pulley causing one of said brake shoes to be applied to one of said brake drums to retard the speed of rotation of one of the spindles and an upward movement of said pulley causing the other of said brake shoes to be applied to the other of said brake drums to retard the speed of rotation of the other of said spindles.

7. In a machine for winding filaments, the combination with two spindles for the reception of bobbins, one from which filament is to be unwound, and the other on which filament is to be wound, a differential mechanism, driving means for said spindles, said spindles being connected with each other and to the driving means through said differential mechanism, of a brake cooperating with one of said spindles, a second brake cooperating with the other spindle, means actuated by the tension of the filament which is being wound from one of said bobbins to the other, said means being adapted to control both the two said brakes so as to apply the one whilst the other is relieved, and means also actuated by the tension of the filament which is being wound from one of said bobbins to another for stopping the machine.

8. In a machine for winding filaments, the combination with two spindles for the reception of bobbins, one from which filament is to be unwound, and the other on which filament is to be wound, a differential mechanism, driving means for said spindles, said spindles being connected with each other and to the driving means through said differential mechanism, of brake drums and interconnected brake shoes, said brake drums being provided one on each of the said two spindles, said brake shoes being actuated by the tension of the filament which is being wound from one bobbin to another, one of said brake shoes being arranged to be applied to one of said drums for retarding the speed of rotation of one of the said spindles, whilst the other brake is relieved allowing the speed of rotation of the other of the said spindles to accelerate, and means also actuated by the tension of the filament which is being wound from one of said bobbins to another for stopping the machine.

9. In a machine for winding filaments, the combination with two spindles for the reception of bobbins, one from which filament is to be unwound and the other on which filament is to be wound, a differential mechanism, driving means for said spindles, said spindles being connected with each other, and to the driving means, through said differential mechanism, of brake drums and interconnected brake shoes, said brake drums being provided one on each of said spindles, a pulley over which the filament which is being wound from one bobbin to another passes, said pulley being connected to and operating said interconnected brake shoes, said brake shoes being actuated by the tension of the filament which is being wound from one bobbin to another, a downward movement of the said pulley causing one of said brake shoes to be applied to one of said brake drums to retard the speed of rotation of one of the spindles and an upward movement of said pulley causing the other of said brake shoes to be applied to the other of said brake drums to retard the speed of rotation of the other of said spindles, and means also actuated by the tension of the filament which is being wound from one of said bobbins to another for stopping the machine.

10. In a machine for winding filaments, the combination with two spindles for the reception of bobbins, one from which filament is to be unwound and the other on which filament is to be wound, a "stator" and a "rotor" of an electrical alternating current field motor, one of said spindles being connected to the "stator" and the other of said spindles to the "rotor", of a brake cooperating with one of said spindles, a second brake cooperating with the other spindle, means actuated by the tension of the filament which is being wound from one of said bobbins to the other, said means being adapted to control both the two said brakes so as to apply the one whilst the other is relieved, and means also actuated by the tension of the filament which is being wound from one of said bobbins to another for stopping the machine.

11. In a machine for winding filaments, the combination with two spindles for the reception of bobbins, one from which filament is to be unwound, and the other on which filament is to be wound, a "stator" and a "rotor" of an electrical alternating current field motor, one of said spindles being connected to the "stator" and the other of said spindles to the "rotor", of brake drums and interconnected brake shoes, said brake drums being provided one on each of the said two spindles, said brake shoes being actuated by the tension of the filament which is being wound from one bobbin to another, one of said brake shoes being arranged to be applied to one of said drums for retarding the speed of rotation of one of the said spindles, whilst the other brake is relieved, allowing the speed of rotation of the other of the said spindles to accelerate, and means also actuated by the tension of the filament which is being wound from one of said bobbins to another for stopping the machine.

12. In a machine for winding filaments, the combination with two spindles for the reception of bobbins, one from which filament is to be unwound and the other on which filament is to be wound, a "stator" and a "rotor" of an electrical alternating current field motor, one of said spindles being connected to the "stator" and the other of said spindles to the "rotor", of brake drums and interconnected brake shoes, said brake drums being provided one on each of said spindles, a pulley over which the filament which is being wound from one bobbin to another passes, said pulley being connected to and operating said interconnected brake shoes, said brake shoes being actuated by the tension of the filament which is being wound from one bobbin to another, a downward movement of the said pulley causing one of said brake shoes to be applied to one of said brake drums to retard the speed of rotation of one of the spindles and an upward movement of said pulley causing the other of said brake shoes to be applied to the other of said brake drums to retard the speed of rotation of the other of said spindles, and means also actuated by the tension of the filament which is being wound from one of said bobbins to another for stopping the machine.

ERIC L. WILDY.