

Aug. 2, 1927.

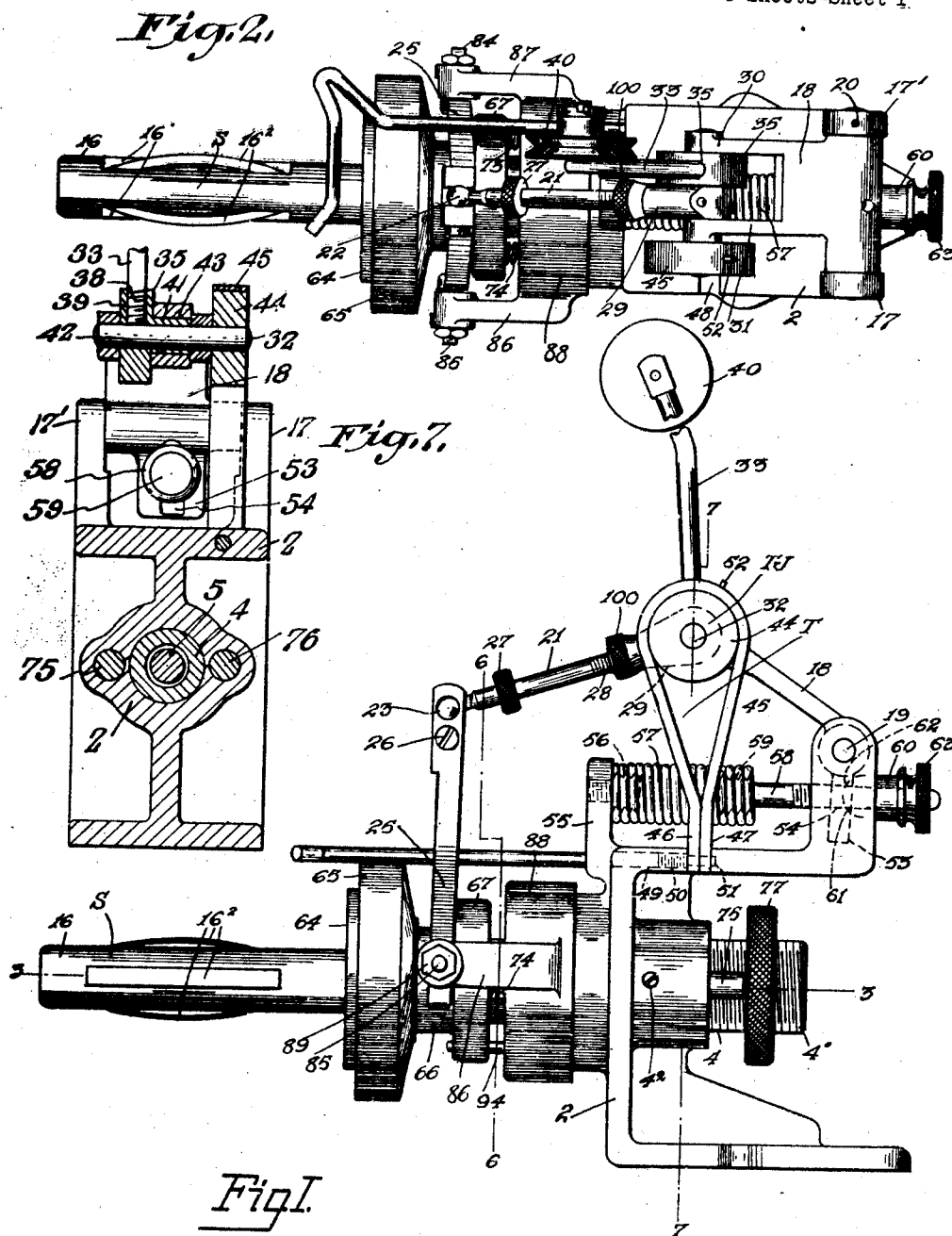
M. B. GROUT

1,637,483

TENSION DEVICE

Filed Feb. 5, 1925

3 Sheets-Sheet 1.



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3 Sheets-Sheet 2

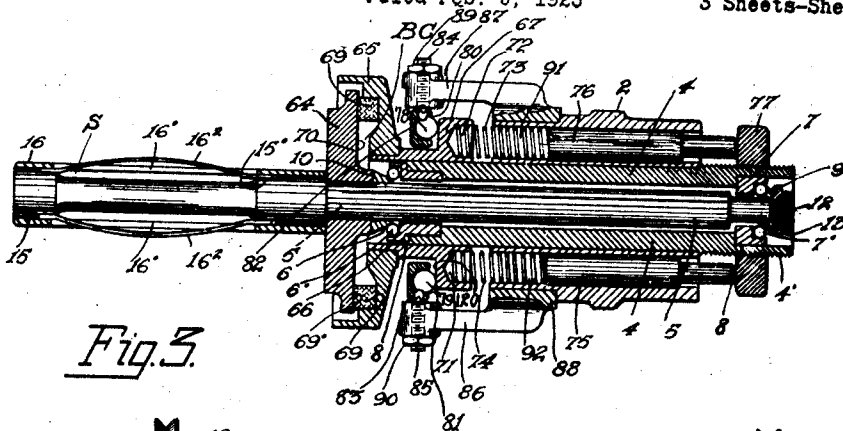


Fig. 3.

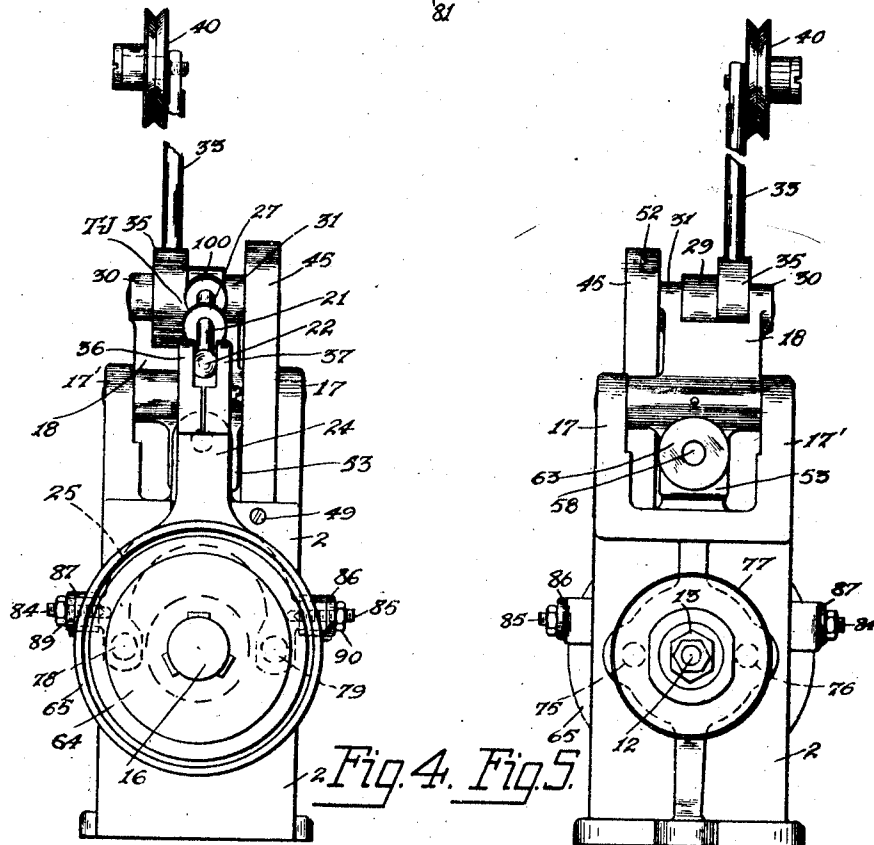


Fig. 4. Fig. 5.

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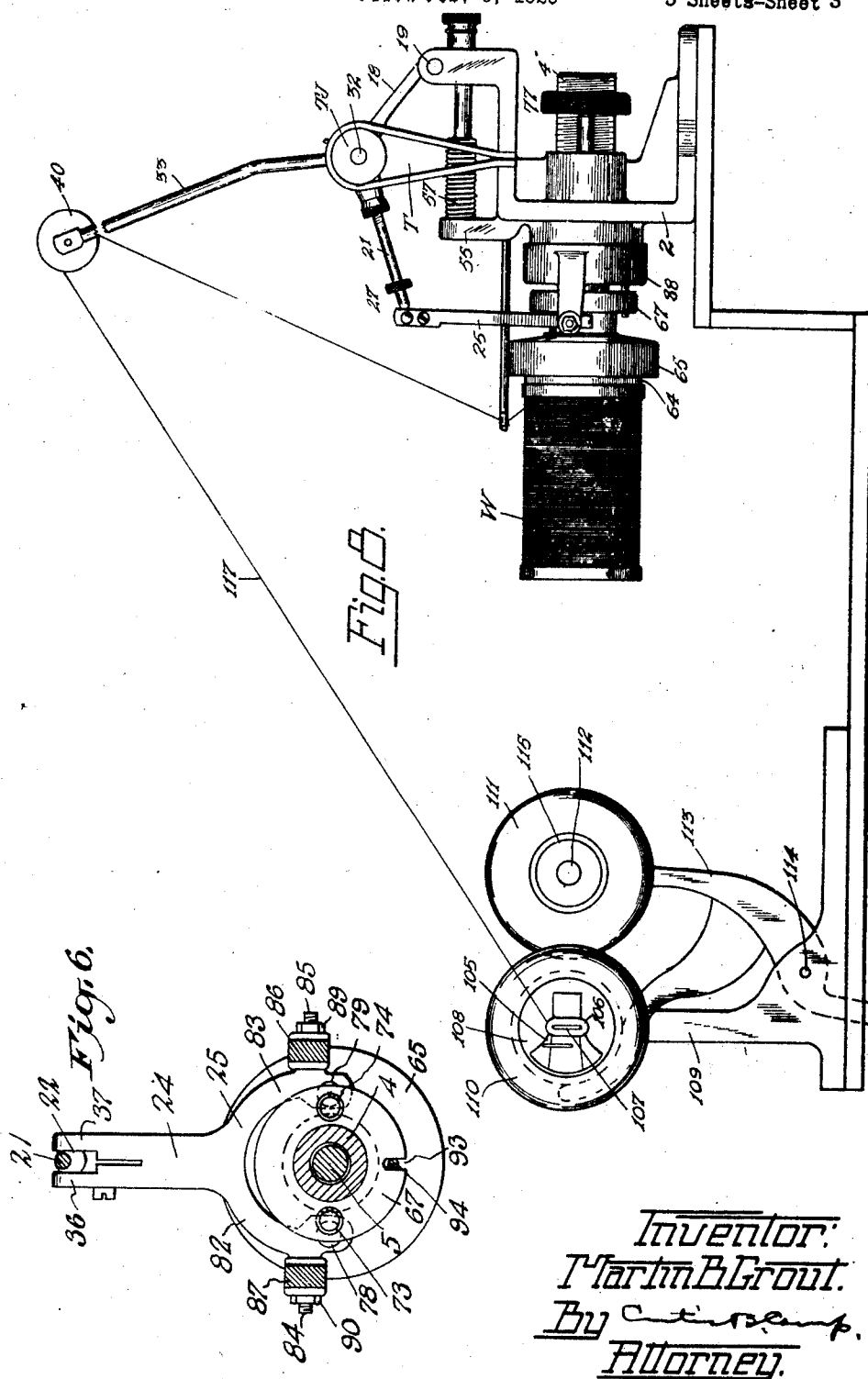
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TENSION DEVICE

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3 Sheets-Sheet 3



UNITED STATES PATENT OFFICE.

MARTIN B. GROUT, OF CHICAGO, ILLINOIS, ASSIGNOR TO KELLOGG SWITCHBOARD AND SUPPLY COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

TENSION DEVICE.

Application filed February 5, 1925. Serial No. 6,959.

My invention relates to winding machines, and has to do more particularly with winding machines of the class which are used for winding coils. The main object of my invention is to provide an improved tension device for winding machines in which coils made from wire may be wound at high speed and the traveling strand of wire, which is being wound on the coil, is kept, substantially, at a constant tension.

In winding coils, it is important to keep the tension on the wire as nearly constant as possible throughout the winding operation. This is especially true when small coils, such as transformer and receiver coils, are being wound with fine gauge wire. A suitable winding machine in combination with the tension device of my invention is provided with a winding mandrel or chuck suitably operated by motor driven means and the only connection between the winding mandrel and the tension device, which carries the supply spool, is the traveling strand of wire. An object of my invention is the provision of a new and improved tension device, for the purpose of controlling the tension of the wire or strand being wound. This controlling action is exercised at two points; namely, at the winding point of the mandrel and at the point of supply of the strand. My tension device is adapted for use not only with manually controlled winding machines but also with automatically controlled winding machines.

A feature of my invention is the provision of a sensitive take up device in which every variation in the rate of travel of the strand at the point of winding is instantly responsive to every decrease or increase of travel of the strand and will effect the corresponding necessary variations in the speed of travel of the supply means through the actuation of a novel combined clutch and braking means.

Another feature of my invention is the application of a toggle joint in combination with novel adjusting means whereby the take up device may be adjusted so that an approximately constant tension is placed upon the strand of wire in its travel from the source of supply to the point of winding.

Still another feature of my invention is the provision of adjustable means for one arm of the toggle joint whereby a slight movement of the control arm will cause an

instantaneous operation of the combined clutch and braking means.

A further feature of my invention resides in the fact that the spring tension on the control arm of my device is practically constant regardless of the position it may be in.

A still further feature of my invention resides in the fact that the spring means performs the function of a back stop for the control arm when it recedes to its vertical position.

Another feature of my invention is the provision of a guide for the traveling strand of wire at the source of supply of the wire.

Another feature of my invention is the provision of an improved adjustable tension for the brake mechanism of the tension device whereby the amount of pressure exerted by the brake drum on the brake disk may be micrometrically adjusted so as to make the tension device universally applicable for all gauges of wire. This adjustable tension for the brake mechanism provided means whereby only a slight pull when placed on the source of supply will cause the brake means to release or it may be adjusted so that a strong pull may be placed on the brake means before the brake means releases.

Other features of my invention not hereinbefore referred to will be hereinafter described in the ensuing specification and claims.

For a more complete understanding of my invention, reference may be had to the accompanying drawings, in which like reference characters in the several views of the drawings denote like parts, and in which:

Fig. 1 is a side elevation of the tension device of my invention;

Fig. 2 is a plan view of Fig. 1;

Fig. 3 is a sectional view along the line 3—3 of Fig. 1;

Fig. 4 is a left end view of Fig. 1;

Fig. 5 is a right end view of Fig. 1;

Fig. 6 is a sectional view along the line 6—6 of Fig. 1;

Fig. 7 is a sectional view along the line 7—7 in Fig. 1;

Fig. 8 is a side elevation of the device of my invention illustrating it in association with a coil chuck and its power driven means.

Referring now more in detail to my invention, as illustrated, it comprises a supporting frame 2 upon which the mechanism of the tension device is supported. A sleeve 4 is

inserted in a suitable orifice in the frame 2 and held in place by any suitable means such as a set screw 42.

A spool holder S comprises a shaft 5 which is rotatably supported as a whole by the bearings 6 and 7. The bearings 6 and 7, which rotatably support the spool holder S, are of the well known ball bearing type, and consist of the usual ball races or cups 8, cones 9 and 10, and ball-bearings 6' and 7'. The sleeve 4 is provided with annular recesses in its respective ends which are adapted to receive the ball races 8 of the bearings 6 and 7 and as these annular recesses are slightly smaller than the diameter of the ball races 8 a force fit is provided for maintaining the ball races 8 in position in the respective annular recesses in the sleeve 4. The cone 10 of the bearing 6 is positioned on the shaft 5 by means of a drive fit and in association with the ball bearings 6' and ball race 8, rotatably supports the shaft 5 of the spool holder S at this point. The cone 9 of the bearing 7 has screw threaded engagement with the threaded end 12 of the shaft 5 and its connection with the threaded end 12 of the shaft 5 permits the cone 9 to be adjusted thereon in association with its ball bearings 7' and ball race 8 to prevent longitudinal movement of the shaft 5 in its bearings 6 and 7. When the shaft 5 is adjusted to rotate freely a lock nut 13 having screw threaded engagement with the end 12 of the shaft 5 locks the cone 9 in position to maintain this adjustment. The spool holder S which comprises the forward end of the shaft 5 is provided with a pair of annular reduced portions 15 and 15' and a sleeve 16 is provided which is secured to this forward end of the shaft 5 by means of a drive fit. The sleeve 16 is provided with a plurality of longitudinal slots 16' and leaf springs 16² are provided the free ends of which are inserted in the slots 16' into the annular recesses formed by the annular reduced portions 15 and 15' on the shaft 5 and the inner circumferential face of the sleeve 16. The leaf springs 16² are bowed and their length is slightly shorter than the distance between the shoulders formed by the reduced portions 15 and 15' on the shaft 5, so that when a supply spool W is slipped on the spool holder S the bowed springs 16² are flexed inward and this space between the shoulders formed by the annular reduced portions 15 and 15' on the shaft 5 and the ends of the leaf springs 16² will permit this flexing of the springs 16². This flexing of the springs 16² places them under tension causes them to grip the supply spool W and support the same thereon against movement as the spool W rotates.

The mechanism of my invention is also provided with a combined clutch and tension

device T which will now be described. The frame 2 is provided with a pair of integrally formed supporting brackets 17 and 17' which support a portion of the tension device T. The adjustable tension device T comprises a toggle joint TJ, one arm of which is in the form of a U-shaped member 18 which rests between the brackets 17 and 17' and is pivotally supported on a pivot pin or shaft 19 which pivot pin or shaft 19 is in turn supported by the brackets 17 and 17' in suitable orifices, and held therein by means of a set screw 20. The other arm of the toggle joint TJ is in the form of an adjustable rod 21 one end of which is enlarged in the shape of a ball 22 which rests in suitable orifices 23 in the bifurcated ends 36 and 37 of an extension arm 24 of a yoke 25, the ball 22 and the orifices 23 forming a ball and socket joint thus allowing a rotatable motion to take place. The bifurcated ends 36 and 37 of the extension arm 24 of the yoke 25 are held in contact with the ball 22 by means of a screw 26 which has screw-threaded engagement with a suitable tapped orifice in the bifurcated end 36, which is provided for this purpose. The rod 21 is also provided with a thumb member 27 which is for use in rotating the rod to adjust the same in relation to the yoke 25 as will be more fully described hereinafter. The other end 28 of the rod 21 is threaded and has screw threaded engagement with a threaded orifice in a member 29 which is pivotally supported between the arms 30 and 31 of the U-shaped member 18 as will now be described, and a locking member 100 having threaded engagement with the threaded end of the rod 21 is provided to lock the rod in its adjusted position. The arms 30 and 31 of the bifurcated portion of the U-shaped member 18 extend forward and support between them a pivot pin or shaft 32 to which is secured a disk 35.

An arm 33 is provided with a threaded end portion 38 that has screw-threaded engagement with an orifice 39 in the disk 35 and secures the rod 33 to the disk 35 and also serves as a set screw to hold the disk 35 on the shaft 32. The other end of the rod 33 supports a wheel 40 which is secured thereto in any suitable manner and serves as a guide for the traveling strand of wire 117 when the machine is in operation.

The disk 35 is provided with an integrally formed eccentric portion 41 in relation to the central orifice 42 of the disk 35 and is of a size to enter the central orifice 43 of the member 29 to which is secured one end 28 of the rod 21. A disk 44 is also secured to the shaft 41 by means of a suitable set screw and is concentrically secured to the shaft 32 in relation to the disk 35. The shaft 32 supported by the arms 30 and 31 of the U-shaped member 18 forms the pivot joint for

the arms of the toggle joint TJ, one arm of which is the U-shaped member 18 and the other arm of which is the rod 21 and its supporting means 22 and 29, respectively supported on the eccentric portion 41 and the bifurcated ends 36 and 37 of the extension arm 24. A leather strip 45 is placed around the disk 44, the ends 46 and 47 of which are placed in an aperture 48 in the frame 2 and are held in place by a screw 49 which has screw-threaded engagement with a tapped orifice 50 in the frame 2. The screw 49 is provided with a reduced end which extends through orifices in the ends 46 and 47 of the strip 45 and into an aligned recess 51 provided in the frame 2 thus securing the ends 46 and 47 of the leather strip in place. A pin 52 secured to the disk 44 extends through the leather strip 45 for purposes as will be described presently. The depending arm 53 of the U-shaped member 18 is provided with a central orifice 54.

A rod 58 is provided which extends through the central orifice 54 of the depending arm 53 and is provided with an enlarged threaded portion 59 upon which the one end of a spiral spring 57 is threaded. A stud 56 secured to an arm 55 integral with the frame 2 is provided with a threaded portion and receives the other end of the spring 57. A member 60 having a rounded end 61 is provided with a central orifice which permits it to be slipped over the end of the rod 58 which protrudes through the central orifice 54 in the arm 53 of the U-shaped member 18 and its rounded end 61 rests in a concave depression 62 of the depending arm 53 to form a ball and socket joint between the rounded end 61 of the member 60 and the depression 62 of the depending arm 53. The protruding end of the rod 58 is threaded and is adapted to receive a thumb nut 63 which when threaded upon the rod 58 forces the rounded end 61 of the member 60 into the depression 62 of the depending tongue 53 and this thumb nut 63 is for the purpose of adjusting the tension of the spring 57 for purposes as will be described presently.

I also provide a combined brake and clutch mechanism BC which is controlled by the movement of the toggle joint TJ and comprises a brake disk 64 which is secured to the shaft 5 by means of a drive fit and a brake drum 65 which is cup shaped in form and is supported, by means of a drive fit, upon an extension 66 of a collar 67 which is slidably supported upon the sleeve 4. A ring 69 of suitable material such as leather rests in the cup portion of the drum 65 and is secured to the drum 65 in any suitable manner with its peripheral face 69' engaging the inner peripheral face 70 of the disk 64.

The collar 67 which is slidably supported upon the sleeve 4 has a notch 93 through

which a pin 94 extends. This pin is secured to the frame 2 and prevents the disk 67 from rotating on the sleeve 4. The collar 67 also has a pair of orifices 71 and 72 located diametrically opposite into which the ends of a pair of spiral springs 73 and 74 are inserted. The other ends of the springs are placed in orifices 91 and 92 located in the frame 2 where are located plungers 75 and 76 of a size to conveniently fit the orifices 91 and 92. One end of each plunger is in contact with one end of each spiral spring and the other end of each plunger 75 and 76 projects beyond the frame 2 and comes in contact with a thumb-nut 77 which has screw threaded engagement with the threaded end 4' of the sleeve 4.

The thumb nut 77 may be turned in a clockwise or counter-clockwise direction to increase or decrease the tension of the springs 73 and 74. When the thumb nut 77 is turned in a clockwise direction on the sleeve 4 with reference to Fig. 5 the plunger rods 75 and 76 are forced in with relation to Fig. 3 against the tension of the springs 73 and 74 placing them under greater compression. Due to the fact that the springs 73 and 74 bear against the collar 67 the increased tension of the springs 73 and 74 causes the leather ring 69 of the brake drum 65, which is secured to the collar 67, to grip the brake disk 64 tighter, as will be more fully hereinafter described. To decrease the tension of the springs 73 and 74 to permit the leather ring 69 to grip the brake disk 64 lightly, a rotation of the thumb nut 77 in a counterclockwise direction will permit the plunger rods 75 and 76 to be forced out by the tension of the springs 73 and 74. This decreased tension of the springs 73 and 74 as is readily apparent will permit the ring 69 of the brake drum 65 to engage the brake disk lightly.

The yoke 25 is pivotally supported by pivot pins 84 and 85 which have a screw threaded engagement with orifices in arms 86 and 87 of a ring member 88 that is fastened to the frame 2 by means of a set screw. The pivot pins are held fast in their adjusted position by means of lock nuts 89 and 90 which have screw threaded engagement with said pivot pins 84 and 85. Suitable orifices are provided in the legs 82 and 83 of the yoke 25 for the entrance of the pivot pins 84 and 85. The legs 82 and 83 of the yoke 25 are also provided with orifices 80 and 81 in which are inserted ball-bearings 78 and 79 which engage with the face 120 of the disk 67 for purposes as will presently be described.

I have described, in detail the apparatus comprising the mechanism of my invention and now I will describe, in detail, the operation of the same in connection with its operation.

For the purpose of illustrating and describing my invention I have shown the tension device operating in connection with a chuck for winding receiver coils but it is to be understood that the tension device of my invention is applicable for other uses and may be used in conjunction with a machine of the multiple type such as a multiple winding machine as described in an application filed by me June 3, 1922, Serial No. 565,630.

The chuck 105 for holding the coil 106 to be wound may be of any suitable type such as illustrated in Fig. 7 and is secured to a shaft 107 which is rotatably mounted in bearings 108 of a suitable supporting bracket 109 which is mounted on a suitable winding bench or table. A wheel 110 secured to the shaft 107 is operatively associated with a friction wheel 111 which is rotatably supported in bearings of a rocker arm 113 which is pivotally secured to a bracket 109 at the pivot pin 114. The shaft 112 also carries a pulley wheel 115 which by means of suitable transmission, such as a belt, drives the shaft 112 and a friction wheel 111 secured thereto. The arm 113 is connected to a suitable starting foot pedal (not shown) which when actuated rocks the arm 113 and its parts as a whole and causes the wheel 111 to engage the wheel 110 on the shaft 107. Due to the frictional engagement between the wheels 110 and 111, the shaft 107 to which is attached the chuck 105 which holds the coil 106 which is to be wound starts to rotate. The spool of wire held upon the spool holder S has its end threaded over the guide wheel 40 and secured to a terminal of the coil 106 to be wound and the instant that the shaft 107 starts to rotate wire is placed upon the core of the coil 106, which is to be wound, and the operator now guides the strand of wire 117 back and forth to place the requisite number of turns on the coil.

The instant that rotation is started, a tension is placed upon the wire strand 117. The arm 33 is in the position shown in Fig. 8 before the starting pedal is actuated and held in this position by the spiral spring 57. Pull or tension of which is such as to force the member 60, slidably supported upon the rod 58, against the arm 53. Due to this tension or pull, against the depending arm 53 of the U-shaped member 18, the arms of the toggle joint TJ which are the U-shaped member 18, and the adjustable rod 21, and its associated parts which are connected to the toggle pivot 32 are held in their raised position, the normal position of the toggle pivot 32 being controlled by the pin 52 in association with the leather strip 45, which rests on a portion of the peripheral face of the disk 44 as before described. The instant the starting pedal is actuated, a tension or pull is placed upon

the strand of wire 117. This tension or pull is caused by the rotation of the shaft 107. The tension or pull on the strand of wire 117, which as before described rides over the guide wheel 40 secured to the arm 33, causes the arm 33 to be moved downward due to the pull or tension of the strand of wire 117 that is attached to the core of the coil 106 held by the chuck 105. The arm 33 is secured to the disk member 35 and as the disk member 35 is secured to the shaft 32, the said shaft 32 is rotated in its bearings in the arms 30 and 31 of the U-shaped member 18. The disk 44 which is also secured to the shaft 32 is rotated and due to the pin 52 secured to the disk 44 and its connection with the leather belt 45 which rests upon a portion of the periphery of the disk 44 and whose ends 46 and 47 are secured to the frame 2, the pivot pin 32 of the toggle joint TJ is forced downward. Due to this movement, the arms 30 and 31 of the U-shaped member 18 and the rod 21 which is connected to the pivot pin 32 by the member 29, are also moved downward. This pull caused by the movement of the arm 33 forces the ends of the arms 30 and 31 of the U-shaped member 18 which are connected to the toggle pivot pin 32 downward thus causing the U-shaped member 18 to rotate, as a whole, about its supporting shaft 19.

The arm extension 53 of the U-shaped member 18 is moved to the right, in reference to Fig. 1, and forces the member 60 and the rod 58 and its adjustable thumb screw 63 to the right against the normal tension of the spiral spring 57, thus placing the spring 57 under additional tension. The rod 21, which serves as the other arm of the toggle joint TJ, due to its connection with the toggle pivot 32 is also forced downward and this movement of the rod 21 causes the integrally formed arm 24 of the yoke 25 to be moved to the left due to its connection with the rod 21. The movement of the arm 24 of the yoke 25 to the left with reference to Fig. 1 causes the yoke 25 to swing about its pivot pins 84 and 85 and the bearings 78 and 79 which are located in orifices in the legs 82 and 83 of the yoke 25 which engage the face 120 of the collar 67 will cause the said collar 67 to move to the right on the sleeve 4 against the tension of the spiral springs 73 and 74. This movement of the collar 67 causes the brake drum 65 which is secured to the collar 67, to move to the right and partially disengages the band 69 from contact with the disk 64 which removes some of the drag from the spoolholder S to permit the spoolholder S and the spool of wire W as a whole to rotate more freely to relieve the extra strain on the wire 117 placed thereon when the shaft 107 started rotating. After the machine has started and

has picked up speed and is rotating at a uniform speed, the combination of the arm 33 in association with the toggle joint TJ and the spring 57 and the brake drum 65 and disk 64 in association with the spiral springs 73 and 74 will keep the strand of wire 117 at as near a constant tension as is possible.

The member 29, into which one end of the rod 21 is threaded, is pivotally supported on the eccentric extension 41 of the disk 35 to give an additional movement as will now be described. As the arm 33 starts its downward travel, the disk 35 is rotated as just described causing the toggle joint TJ to move in a downward direction. And, as the disk 35 is rotated the eccentric extension 41 is also rotated and due to its eccentric position on the shaft 32 causes the member 29 which is pivotally supported on this eccentric portion 41 of the disk 35 to be moved to the left in addition to its normal movement caused by the downward movement of the toggle pivot 32, and as the rod 21 is threaded to this member 29 the rod 21 is also moved to the left in addition to its steady downward movement caused by the downward movement of the toggle pin 32 for purposes as will now be described.

Coils such as are used in receiver and transformer coils, and especially those used in connection with radio receiving sets are wound with a very fine wire to obtain a high ohmic resistance. When the machine upon which these coils are wound, is started a sudden strain is placed on the fine wire and, if means are not provided to equalize this strain, the wire will snap. With the tension means of my invention the instant the starting pedal is actuated a tension or pull is placed upon the strand 117. This is caused by the starting of the machine and as the coil to be wound starts to rotate the wire strand starts to unwind from the spool W. As the spool W and its wire which is supported by the spoolholder S is dead weight all the strain, in starting the holder S and its supported spool of wire rotating as a whole, is placed on the fine strand of wire. The arm 33 in its downward movement causes the toggle joint TJ to function in a steady even movement to cause the yoke 25 to swing about its pivot pins 84 and 85. The instant this movement takes place the eccentric portion 41 of the disk 35 also acts and gives the rod 21 of the toggle joint TJ an additional thrust causing the yoke 25 to instantly respond to this additional thrust and permit the friction ring or band 69 of the brake drum 65 to instantly disengage the disk 64 thus permitting the spool of wire W and spoolholder S, as a whole, to run entirely free until the spool holder S and the spool W supported by it, has picked up speed. Then the arm 33 and its associated

parts operate to automatically regulate the tension of the strand of wire 117.

It sometimes happens that the wire upon the supply spool W is crossed for a few turns and causes a sudden pull upon the strand 117 which is being fed to the coil 106 which is being wound. In a case of this kind, the instant the sudden pull occurs, the added strain on the strand 117 becomes effective immediately and overcomes the tension of the spring 57 which tends to hold the arm 33 in its normal position, and causes the arm 33 to be instantly drawn down against the tension of the spring 57, which causes the toggle joint TJ to function. The downward movement of the toggle joint TJ, causes the rod 21 to be forced to the left, with the additional thrust brought about by the eccentric 41 as before described, and causes the tongue extension 53 to be moved to the right to place the spring 57 under a greater tension. This movement of the rod 21 causes the yoke 25 to instantly rotate about its pivot pins 84 and 85 to force the collar 67 and the brake drum 65 fastened on the extension 66 of the collar 67 to the right to permit the spoolholder S to run entirely free to release the strain placed on the strand 117 being fed to the coil 106 being wound. Now when this added strain or pull has stopped, due to the crossed windings having been removed during the winding operation, the tension of the spring 57 is powerful enough to pull the tongue extension 53 to the left thus causing the U-shaped member 18 to rotate, on its pivot pin 19, and move its integrally formed arms 30 and 31 upward and by means of the spring 57 and leather belt 45 in combination with the toggle joint TJ, the yoke 25 is rotated about its pivot pins 84 and 85 and in combination with the disk 67 and the spiral springs 73 and 74 forces the friction ring 69 of the brake drum 65 against the face of the brake disk 64 to again check the speed of the spool holder S so as to again permit the proper tension to be placed upon the strand of wire 117 that is being fed to the coil 106 which is being wound.

Should the strand of wire 117 break, as it will do if the supply at W is tangled, the arm 33 is instantly moved to its extreme down position against the tension of the spring 57. Then when the wire strand 117 snaps, the spring 57 forces the arm 33 back to its normal position as before described and as the spring 57 is under added tension, due to the movement of the arm 33, the said arm 33 is moved back with considerable force. To check the blow of the toggle joint TJ and its associated parts when they are moved back to their normal positions, the pin 52 secured to the disk 44 acts upon the leather belt 45 causing the parts on the shaft 32, which is rotatably supported by the arms 30 and 31 of the U-shaped member 18, to

rotate in the opposite direction to force the pivot pin 32 of the toggle joint TJ downward, again placing added tension on the spring 57. The spring 57, in this instant, absorbs the blow of the returning toggle joint TJ and its supported parts and acts as a buffer. With this arrangement I may dispense with a fixed stop as the belt 45 in combination with the spring 57 will always tend to hold the arm 33 in its normal position.

The rocking arm 33 and its guide wheel 40 constitutes a light rocking element freely movable in one direction under the influence of the tension exerted by the loop of wire from the supply to the coil being wound, when the machine is started; and as freely movable in an upward direction under the influence of the spring 57 which opposes the pull of the loop of wire. The arm 33 will move upward as the tension of the strand of wire 117 between the supply and the winding point decreases and will move downward, as the tension on the strand of wire 117 increases between the supply and the point of winding, to overcome the power exerted by the spring 57 which tends to hold the arm 33 in its normal position. Through the medium of the movable arm 33 which is under an adjustable spring tension in combination with a brake drum 65 and a disk 64 which is automatically engaged and disengaged the instant the arm 33 moves up or down through the agency of the yoke 25 and the collar 67 which is always under spring tension, the tension of the strand of wire being fed to a coil may be maintained approximately constant at all times.

The thumb nut 63 on the threaded end of the rod 58 may be turned to the right or left so that when the machine is started the operator may, by turning the thumb-nut 63 to the right or left as the case may be, increase or decrease the tension of the spring 57 so the right amount of tension will be placed on the spring 57 to keep the tension on the strand of wire approximately constant at all times for different gauges of wire. The thumb-nut 27 on the rod 21 may be turned to the right or left as the case may be, and being secured to the rod 21, this arm of the toggle joint TJ may be lengthened or shortened in which case the nut 27 is turned to the right to thread the threaded end 28 of the rod 21 further into the orifice provided in the member 29. As this arm of the toggle joint is shortened, the yoke 25 is moved about its pivot pins 84 and 85, causing the bearings 78 and 79 in the orifices 80 and 81 of the legs 82 and 83 of the yoke 25 to move away from the disk 67, so that the toggle pivot 32 moves downward a considerable distance before the bearings 78 and 79, in the orifices 80 and 81 of the legs 82 and 83 of the yoke 25, engage the disk 67 to move the brake drum 65 away from the brake disk

64. This adjustment is used for the coarser gauges of wire. When the thumb nut 27 is turned to the left, the rod 21 is lengthened and this being the case the yoke 25 is moved about its pivot pins 84 and 85 to move the bearings 78 and 79 against the disk 67 so that the toggle pivot 32 moves only a little way in a downward direction to cause the brake drum 65 to move away from the brake disk 64, through the agency of the legs 82 and 83 of the yoke 25. This adjustment of rod 21 is used for the finer gauges of wire. The adjustment of rod 21 is maintained, in any of its positions, by the lock nut 100.

The thumb-nut 77 located on the threaded end 78 of the sleeve 4, may be turned to adjust the tension of the spiral springs 73 and 74. If the thumb-nut 77 is turned in a clockwise direction so as to place it farther on the sleeve 4, with reference to Fig. 1, the plunger rods 75 and 76 are moved toward the left with reference to Fig. 3 and as the springs 73 and 74 rest between the collar 67 and the plunger rods 75 and 76, the tension of the spiral springs 73 and 74, is increased causing the brake lining or ring 69 of the drum 65 to grip the disk more firmly. This adjustment as just described is used with the coarser gauge wire because the larger the wire the more tension will be exerted on the traveling strand of wire and the increased tension on the spiral springs 73 and 74 will tend to make it more difficult for the disk 67 to be moved against the tension of the spiral springs 73 and 74 and thus more power will have to be exerted by the traveling strand of wire before the toggle joint will move downward to disengage the brake drum 65 from the brake disk 64 through the association of the arm 21, yoke 25, bearings 78 and 79, disk 67, extension 66 of disk 67. If the thumb-nut 77 is turned in a counterclockwise direction to move it to the right, referring to Fig. 1 the tension on the spiral springs 73 and 74 will force the plunger rods 75 and 76 outward with reference to Fig. 3 and the extension of the springs 73 and 74 will diminish thus making it easier for the disk 67, actuated by the bearings 78 and 79, yoke 25, arm 21 and the toggle joint TJ, to move against the tension of the springs 73 and 74 consequently a slight pull of the strand of wire 117 will move the arm 33 downward and will thus release the friction band 69 from engagement with the brake disk 64, by means of the toggle joint TJ, arm 21, yoke 25, bearing 78 and 79, disk 67 and brake drum 65. This adjustment is used for the finer gauge wire. The tension of the spiral springs 73 and 74 is sufficient to hold the thumb-nut 77 in any of its adjusted positions. From the foregoing it will be seen that the device of my invention has two sets of springs, the tension of which may be adjusted to allow for the difference in tension

of the finer and coarser gauge wires that may be used with this device. This dual adjustment of spring tension makes it unnecessary to replace the springs with other springs of a different tension when a different gauge wire is to be wound. The adjustable spring tension and the adjustable thumb-nut 27 for adjusting the throw of the legs of the yoke 25 in relation to the disk 67 make it clear that a very fine adjustment may be obtained so that just the right tension may be maintained on the strand of wire. The adjustment of arm 21 regulates at what point in the travel of arm 33 the friction will be relieved on the rotating drum. That is the arm 21 may be adjusted so that the friction will be relieved as soon as the arm 33 is pulled partly down or not until at a later point in its travel.

The location of the bearings 6 and 8 is also a noteworthy feature. The ball bearings 6 and 7 are entirely enclosed and are so placed that any dirt which may be on the spool of wire W when it is placed on the spool holder S cannot get into the ball race and prevent the bearings from functioning properly.

While I have illustrated and described a preferred embodiment of my invention, it is to be understood that changes and modifications will readily suggest themselves to those skilled in the art, and I, therefore, aim to cover all such changes and modifications as come within the spirit and scope of the appended claims.

What I claim as new and desire to secure by United States Letters Patent is:

1. In a winding machine, of the character described, including a rotatable spool holder and a source of wire supply, a winding mandrel, a pivoted rocking element having a to-and-fro movement, a toggle joint supporting said rocking element, a plurality of springs provided with adjustable tensioning means, and means controlled by the tension on the strand of wire between the said wire supply and the said winding mandrel for actuating said pivoted-rocking element to operate said toggle to control said rotatable spool holder, said springs in association with said means maintaining a constant tension upon said strand.

2. In a winding machine of the character described, including a source of wire supply and a winding mandrel, a rotatable spool-holder for supporting said source of wire supply, a rocking element that has a to-and-fro movement and supports guiding means over which the strand of wire travels from said source of supply to the winding mandrel, a toggle joint associated with said rocking element, and spring means associated therewith for maintaining said rocking element at rest, brake means for said rotatable spool holder, and means including a pair of

adjustable tension springs between the said toggle joint and said brake means for maintaining a substantially constant tension on the said strand of wire between the source of wire supply and the winding mandrel.

3. A winding machine of the character described including a winding mandrel and a source of wire supply; a rotatable holder for said wire supply; a pivoted rocking arm, a guide wheel therefor; a toggle joint that supports said pivoted rocking arm; brake means associated with said toggle joint, said rocking arm moved by means of the strand of wire passing over, said guide wheel on said rocking arm to cause movement of said toggle joint to actuate said brake means, spring means associated with said toggle joint and a pair of adjustable springs associated with said brake means, maintaining a substantially constant tension upon the strand of wire between the said winding mandrel and said source of supply.

4. In a winding machine of the character described including a winding mandrel and a source of wire supply, a rotatable holder for the said source of wire supply; a toggle joint and a rocking element supported thereby, guiding means associated with said rocking element; a plurality of adjustable springs provided with means for adjusting the tension on said springs, one of said springs holding said rocking arm and said toggle joint in a position of rest; braking means for controlling the rotation of the rotatable spool holder; and means actuated when said rocking arm is moved in one direction by the influence of the tension of the strand of wire between the source of supply and the winding mandrel to actuate the said brake means against the tension of said pair of springs of said plurality of springs to permit the free rotation of the said rotatable spool-holder.

5. In a winding machine of the character described including a source of supply of wire and a winding mandrel, a rotatable holder for supporting the said source of wire supply, a toggle joint, and a spring for holding said toggle joint in a position of rest, a rocking arm supported on said toggle joint and a guide wheel for said rocking arm, over which the strand of wire travels from the source of supply to the winding mandrel, braking means and a pair of springs associated with said braking means, means functioning when the rocking arm moves in one direction to move the said toggle joint against the tension of its associated spring and said pair of springs to operate the said brake means to permit the free rotation of said rotatable holder, said springs moving said toggle joint in the opposite direction when the tension or pull of the traveling strand of wire is such as to permit said toggle joint and its associated parts to

actuate said brake means to check the free rotation of the said rotatable holder, and adjustable means for said springs for regulating the period at which movement of said toggle begins under the tension of said strand of wire.

6. A winding machine of the character described including a source of supply and a winding mandrel, a rotatable holder for supporting the source of supply, means including a toggle joint and a rocking arm having a guide member for supporting a strand of the source of supply between the said source of supply and the winding mandrel, a belt passing over said toggle joint, braking means in association with said toggle joint, said belt being acted upon by the toggle joint when the said rocking arm moves in one direction, against the tension of a plurality of springs, means for adjusting the tension of said springs, and means for moving said strand of wire to cause said rocking arm to move in said one direction and through the agency of said belt cause said toggle joint to actuate and operate said brake means to maintain a substantially constant tension in said strand between the winding point and the supply point.

7. A winding machine of the character described comprising a frame, a source of supply and a winding mandrel, a rotatable holder for the said source of supply; a toggle joint including a pair of arms, a disk secured to said toggle joint supporting an arm and an eccentric integrally formed with said disk carrying one arm of said toggle joint, a second disk secured to said toggle joint, a belt supported on said second disk, the ends of said belt being secured to said frame, braking means connected to said one arm of toggle joint, a plurality of adjustable springs associated with said toggle joint and said braking means, said belt being acted upon when said arm on said first disk moves in one direction, against the tension of a plurality of springs, and under the influence of a tension on said strand to move said toggle joint, said eccentric integrally formed with said first disk acting upon said one arm to give said one arm an additional thrust in combination with the movement of said one arm due to the movement of said toggle joint to actuate the said braking means in association with a pair of springs, the tension of which is adjustable by means of a thumb nut.

8. In a winding machine of the character described including a mounting frame, a sleeve member secured to said frame, a source of wire supply and a winding mandrel, a spool holder rotatably supported in said sleeve for supporting said source of wire supply, brake means including a disk secured to said spool holder and a brake drum slidably supported on said sleeve, a pair of

springs supported by said frame normally maintaining said drum in engagement with said disk, a toggle joint supported by said frame and a rocking arm secured thereto, guide means on said arm, a spring for maintaining said toggle normally at rest, said arm moving in one direction under the tension of a strand traveling over said guide means between said wire supply and said mandrel to move said toggle to actuate means to slide said drum on said sleeve against the tension of said spring and said pair of springs to permit the free rotation of said spool holder.

9. In a winding machine of the character described including a mounting frame, a sleeve member secured to said frame, a source of wire supply and a winding mandrel, a spool holder rotatably supported in said sleeve for supporting said source of supply, a toggle joint supported by said frame and an arm secured thereto, guide means on said arm, brake means including a disk secured to said spool holder and a brake drum slidably supported on said sleeve, a spring associated with said toggle for maintaining said toggle at rest, a pair of springs supported in said frame for maintaining said drum in engagement with said disk, a yoke connecting said brake means with said toggle, said arm moving in one direction under the tension of a strand traveling over said guide means between said wire supply and said mandrel to move said toggle to actuate said yoke to slide said drum on said sleeve against the tension of said pair of springs to permit free rotation of said spool holder.

10. In a winding machine of the character described including a mounting frame, a sleeve member secured to said frame, a source of wire supply and a winding mandrel, a spool holder rotatably supported on said sleeve for supporting said source of wire supply, brake means including a disk secured to said spool holder and a brake drum slidably supported on said sleeve, a pair of springs supported by said frame normally maintaining said drum in engagement with said disk, a toggle joint supported by said frame and a rocking arm secured thereto, guide means on said arm, a spring for maintaining said toggle normally at rest, said arm moving in one direction under the tension of a strand traveling over said guide means between said wire supply and said mandrel to move said toggle to actuate means to slide said drum on said sleeve against the tension of said spring and said pair of springs to permit the free rotation of said spool holder, and adjustable means for said spring and said pair of springs for regulating the period at which movement of said toggle begins under the tension of said traveling strand.

11. A tension device of the character described including a mounting frame, a rotatable shaft extending through said frame and having bearings at the opposite ends thereof, a disk secured to said shaft intermediate of its ends, means on the free end of said shaft for supporting a supply spool, a guiding device supported by said frame, a spring for holding said device in normal position, means for adjusting the active tension of said spring, a slidable braking device supported by said frame and adapted to engage said disk to regulate the speed of rotation of said shaft, spring means acting on said braking device, and means for adjusting the tension of said last spring means.

12. A tension device of the character described including a supporting member, a spool supporting shaft having bearings in said supporting member, a disk secured to said shaft, a guiding device for supplying material from a spool on said shaft to a winding mandrel, adjustable spring means acting on said guiding device, a slidable braking device acting upon said disk for regulating the speed of rotation of said shaft, adjustable spring means operating on said braking device, and mechanism controlled by said guiding device for controlling said braking device.

13. A tension device of the character described including a supporting member, a spool supporting shaft having bearings held by said supporting member, a disk secured to said shaft, a guiding member attached to said supporting member and adapted to have a to and fro movement, adjustable spring means holding said guiding member in its normal position, a slidable braking device cooperating with the said disk for regulating the speed of rotation of said shaft, adjustable spring means acting on said braking means, and means for regulating the point in the path of travel of said guiding means where it becomes effective upon said braking means.

14. A tension device of the character described including a supporting member, a sleeve extending through said member, a rotary shaft supported in said sleeve and a disk secured to said shaft, a braking device slidably supported on said sleeve and engaging said disk for regulating the speed of rotation of said shaft, and adjustable spring means operating on said braking device.

15. A device of the character described, including a supporting member, a sleeve extending through said supporting member, a rotary shaft extending through said sleeve and having bearings in the opposite ends thereof, a disk secured on said shaft, a braking device slidably supported by said sleeve

member and operative upon the said disk in said rotary shaft to regulate the speed of rotation of said shaft.

16. A device of the character described including a supporting member, a sleeve extending through said supporting member, a rotary shaft extending through said sleeve and having bearings in the opposite end thereof, a disk secured on said shaft, a braking device slidably supported by said sleeve member and operative upon the said disk on said rotary shaft, and adjustable spring means operating on said braking device.

17. A device of the character described including a rotatable shaft, a disk secured to said shaft, a slidable braking device cooperating with said disk for controlling the speed of rotation of said shaft, adjustable spring means operable on said braking device, a rotatable control device operative on said braking device, adjustable spring means for said control device, and means for adjusting the point in the travel of said control device where it will operatively control said braking device.

18. A device of the character described including a supporting member, a shaft extending through said supporting member and having bearings to rotatably support the same, a disk secured to said rotatable shaft, a braking device slidably supported by said supporting member and operative upon the said disk supported by said shaft, an actuating device for controlling said braking device, and spring means operative upon said actuating device.

19. A device of the character described including a supporting member, a shaft rotatably supported by said supporting member, a braking disc secured to said shaft, a braking device supported by said supporting member in operative relation with said disc to control the speed of rotation of said shaft, adjustable spring means operating on said braking device, a control device for actuating said braking device, and spring means operating on said control device.

20. A device of the character described including a supporting member, a shaft rotatably supported by said supporting member, a braking disc secured to said rotatable shaft, a slidable braking device cooperating with said disc and supported by said supporting member for controlling the speed of rotation of said shaft, adjustable spring tensioning means operable on said braking device, a rotatable control device operating on said braking device, and adjustable tensioning means for said control device.

Signed by me at Chicago, in the county of Cook, and State of Illinois, this 3rd day of February, 1925.

MARTIN B. GROUT.