

June 21, 1927.

H. F. CARTER

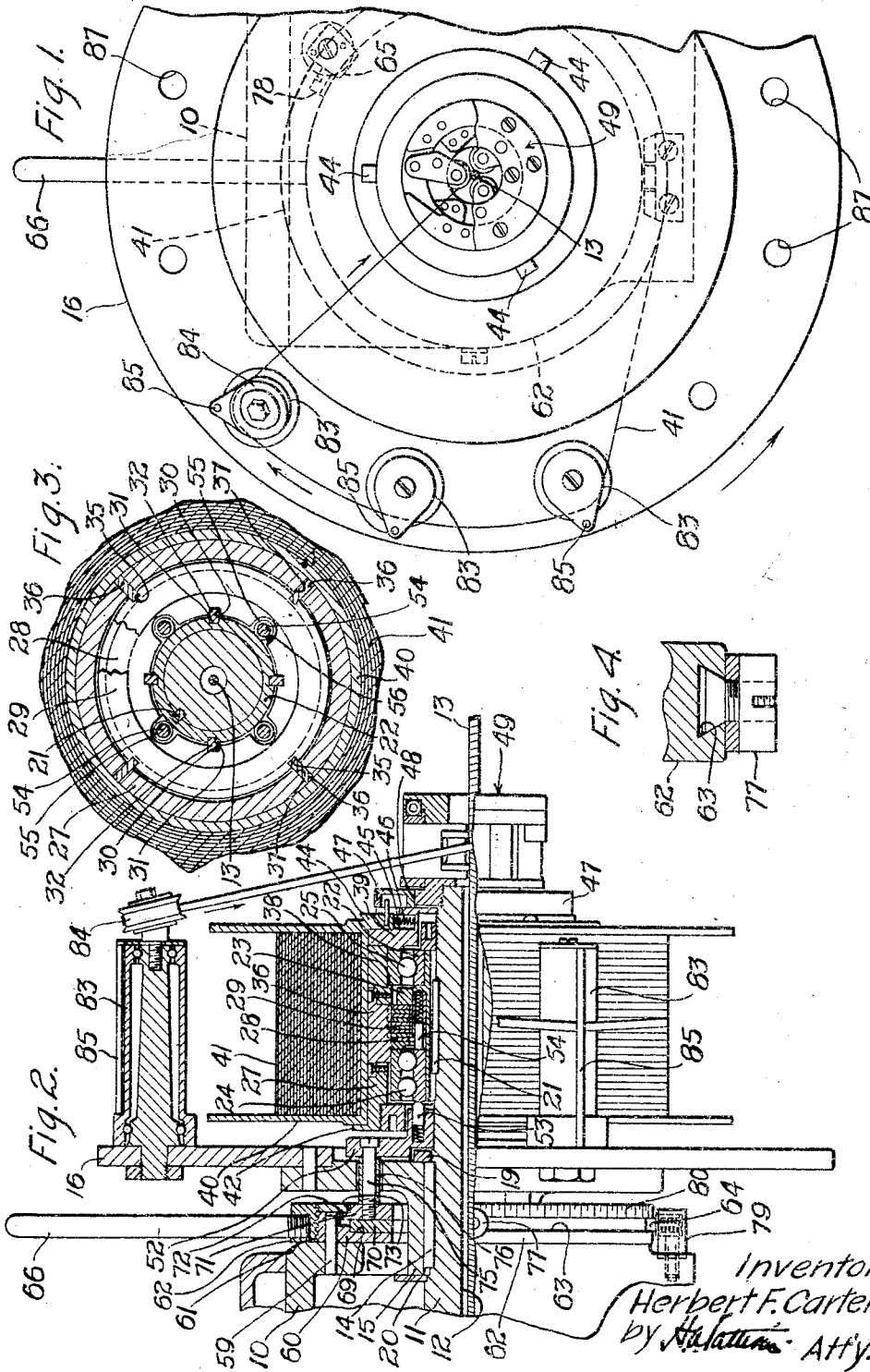
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SERVING MACHINE

Filed Nov. 16, 1925

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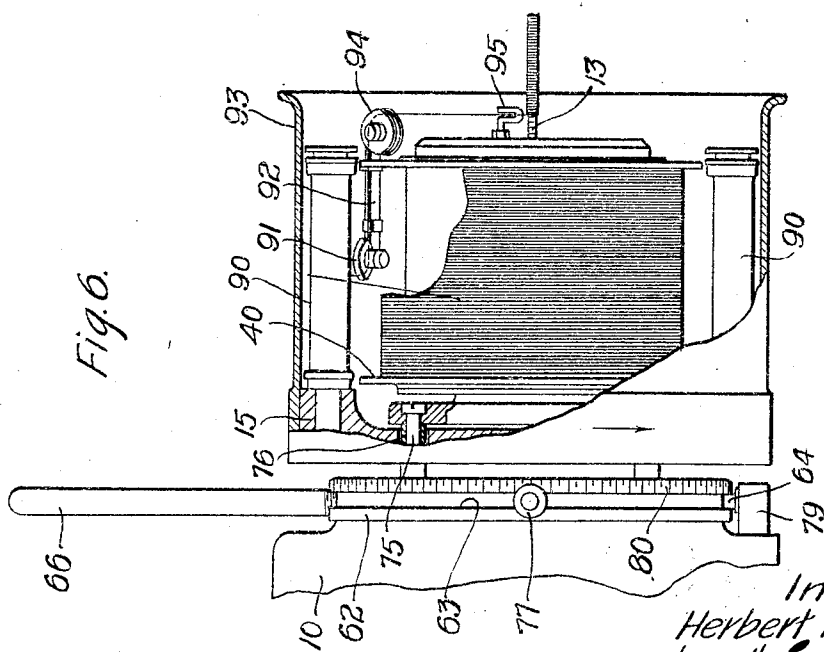
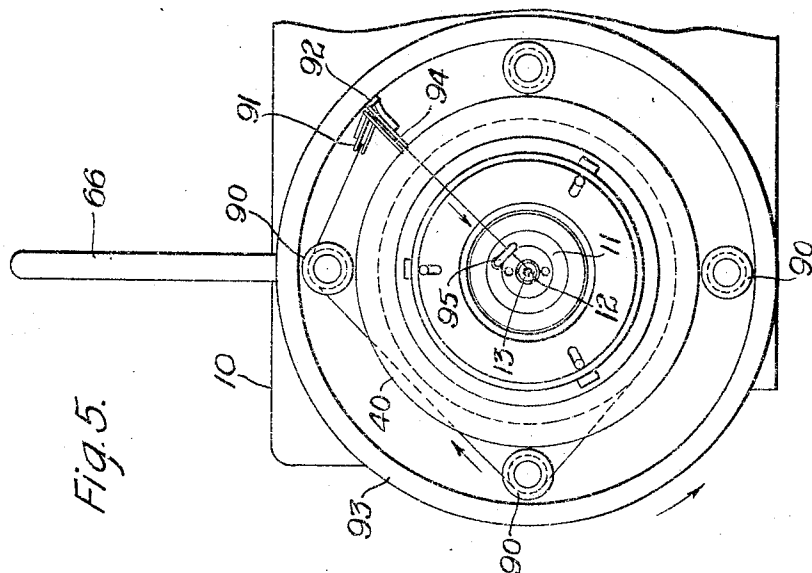
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SERVING MACHINE

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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE.

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SERVING MACHINE.

Application filed November 16, 1925. Serial No. 69,472.

This invention relates to serving machines, and more particularly to serving machines employed in the manufacture of electrical cables.

5 The primary object of this invention is to provide an improved serving head for machines of the aforementioned type, whereby the tension of a material being served to a core may be readily and efficiently varied and controlled manually during the serving operation.

10 In accordance with one embodiment of the invention power for driving a material supply reel is communicated from a rotating spindle having an aperture through which a core passes by means having elements associated with the spindle and supply reel and capable of being regulated to overcome the inertia of the supply reel on starting and adjustable during the rotation of the spindle and supply reel for varying the tension applied to the material served from said supply reel to said core.

15 Specifically there is provided a spool of metallic tape or wire which is adapted to be driven by power communicated through a multi-plate friction clutch, alternate plates of which are operatively connected to the spool and a main driving spindle respectively. The frictional contact between the plates during the operation of the machine is adapted to be regulated to vary the tension upon the material being served by rotating a nut held from lateral movement and threadedly engaging and thereby moving a laterally movable non-rotatable collar surrounding the driving spindle. The lateral movement of the collar in turn is transmitted to the plates to increase or decrease the frictional driving pressure therebetween and consequently the rotary speed of the spool, by a yieldable connection interposed between the friction plates and the collar. An adjustable member carried by the nut and cooperating with a suitable scale provided upon the latter, in association with a fixed member upon the frame of the machine, serves as a means for setting the clutch to provide for a predetermined tension upon the tape or wire being served.

Other objects and advantages of this invention will more fully appear from the following detailed description taken in connection with the accompanying drawings

which illustrate one embodiment of this invention, in which

Fig. 1 is a fragmentary front view of a serving head designed for the serving of tape spirally to a traveling core and embodying this invention;

Fig. 2 is a side view thereof partly in section;

Fig. 3 is an enlarged fragmentary vertical sectional view of Fig. 2, between the frictional plates thereof, looking toward the right;

Fig. 4 is an enlarged detail sectional view of an adjustable stop used in setting the mechanism for predetermined tensions;

Fig. 5 is a fragmentary front view of another type of serving head designed for the serving of wire spirally to a traveling core and embodying this invention, and

Fig. 6 is a side view thereof partly in section.

The serving head illustrated in the drawings and embodying this invention is especially applicable to the type of taping or serving machine disclosed in Patent 1,565,652, issued to F. S. Kochendorfer et al., December 12, 1925, to which reference may be had for a detail description of the machine.

Referring to the drawings, numeral 10 indicates a portion of a taping or serving machine frame with a driving spindle 11 extending therefrom, which is connected by means of a clutch mechanism to the main driving shaft (not shown) of the machine, the spindle being suitably journaled upon a portion (not shown) of the frame and provided with a bore 12 extending longitudinally therein, through which a core 13 to be served passes in the operation of the machine. Secured to the spindle 11 by a key 14 is a flanged sleeve 15 having a ring-like member 16 suitably attached thereto upon its right face, the sleeve 15 and member 16 forming what is termed a serving head. Upon the left end of the spindle 11 is preferably mounted a fly wheel (not shown) which serves to prevent undue acceleration of the serving head when power is applied to the spindle. The sleeve 15 carrying the ring 16 is held from longitudinal displacement upon the spindle 11 by a spanner nut 19 threaded onto the spindle at the right end of the sleeve 15, the opposite end thereof engaging a washer 20 mounted upon a suitable

shoulder formed in the spindle 11. Rotatably secured to the spindle in front of the sleeve 15 by a key 21 (Fig. 3), is a second sleeve 22 provided with an annular flange 23 and freely rotatable upon the periphery of the sleeve 22 and at opposite ends thereof are radial ball bearings 24 and 25.

Freely rotatable upon the peripheries of the ball bearings 24 and 25 is a sleeve 27 serving as a spool or reel carrier. The sleeve 27 is rotated from the spindle 11 by a friction clutch comprising a plurality of alternately arranged ring plates 28 and 29 positioned between opposed end faces of the ball bearing 24 and flange 23.

Referring particularly to Fig. 3, the ring plates 28 are each provided upon its inner periphery with four equally spaced notches or keyways 30 and the sleeve 22 upon its outer periphery is provided with four equally spaced keyways 31 adjacent the left face of the flange 23. Suitably secured within the keyways 31 are keys 32 which also engage within the keyways 30 of the plates 28 and serve, as will readily be apparent, to transmit a rotary motion from the sleeve 22 to the plates 28. The plates 29 are each provided upon its outer periphery with four equally spaced keyways 35 into which project keys 36 which, as clearly shown in Fig. 3, are suitably carried in keyways 37 formed in the outer periphery of the reel carrier or sleeve 27. The keys 32 and 36 fit within the keyways 30 and 31 and keyways 35 and 37, respectively, with sufficient clearance to permit of a longitudinal movement of the plates 28 and 29 with respect to the spindle 11. The left face of the outer race of the ball bearing 25 abuts a shoulder 38 formed upon the sleeve 27 and is locked thereagainst by a collar 39 suitably attached to the sleeve 27.

In the embodiment of this invention as shown, a reel or spool 40 carrying as is clearly shown in Fig. 2, a large supply of metallic tape 41 is mounted upon the sleeve 27 for rotary movement therewith by a suitable key (not shown) with its left face against a flange 42 formed upon the sleeve 27 and is prevented from moving horizontally off of the sleeve 27 when the machine is operating by three equally spaced latches 44. The latches are reciprocally mounted in suitable depressions 45 formed in the collar 39 and are each forced outwardly by a compression spring 46 positioned below the latch within the depression 45. A cam ring indicated at 47 is operatively connected to the latches 44 for the purpose of operating them simultaneously when removing the spool 40. The cam ring is rotatably mounted upon a peripheral portion 48 of a roller device or nozzle 49 screw threaded onto the end of the spindle 11. For a more detailed description and illustration of the latch

mechanism and nozzle reference may be had to my copending application, Serial No. 678,932, filed December 6, 1923, since they form no part of the present invention.

Means for bringing the plates 28 and 29 into driving engagement and for varying the speed of rotation of the plates 29 relative to the plates 28 and consequently the speed of the reel 40 carrying the tape 41 relative to the spindle 11 which directly drives the serving head and thereby the tension upon the tape as it is served to the core 13 during the operation of the machine will now be described.

Slidably carried upon the periphery of the spindle 11 intermediate the ball bearing 24 and the sleeve 15 is a push plate 52 carrying four equally spaced spring pressed plungers 53 which at their outer ends yieldably engage the left face of the ball bearing 24, the opposite face of the ball bearing being similarly engaged by four plungers 54 carried in sleeves 55 suitably fixed within depressions formed in the flange 23 of the sleeve 22. The springs acting upon the plungers 54 have greater force when compressed than the springs associated with the plungers 53, the purpose of which will become apparent as the description progresses. As indicated at 56 (Fig. 3), the plates 28 are notched upon their inner periphery to provide a suitable clearance between the sleeve 55 and the plates to permit the longitudinal movement of the latter. Suitable clearance is also provided between the inner peripheries of the plates 29 and the sleeves 55 for the same purpose. Slidably mounted upon four equally spaced pins 59 fixed at their left end in the frame 10, one of the pins being indicated in Fig. 2, is a collar 60 provided with a left hand screw thread 61 upon its periphery. Threaded onto the periphery of the collar 60 is a nut 62 provided with a circular dove tail channel 63 in its periphery, into which extends, at one point, a spring pressed plunger 64, and at another point a fixed dog 65 (dotted outline Fig. 1). The plunger 64 and dog 65 are fixed to the frame 10 and serve to prevent longitudinal movement of the nut 62 upon rotation thereof on the threaded collar 60. The plunger 64 and dog 65 also serve in another capacity which will be described hereinafter. Secured to the nut 62 is a lever or handle 66 whereby the nut may be turned upon the collar 60, and it will readily be apparent that upon rotating the nut 62 counter-clockwise (Fig. 1) upon the collar 60, the latter will be moved laterally or in a direction parallel to the axis of the spindle 11. The lateral movement of the nut 62 is transmitted to the push plate 52 by the following means: Carried in a circular channel 69 formed in the collar 60 is a thrust washer 70, composed of any suitable

bearing material, and engaging the right face thereof is a thrust plate 71 provided with a circular flange 72 upon its periphery. Secured to the collar 60 by screws (not shown) is a ring 73, the right face of the nut 62, ring 73 and thrust plate 71 being in vertical alinement. The ring 73 serves to lock the thrust plate 71 and the collar 60 together as a unit. The push plate 52 is fixed to the thrust plate 71 by three equally spaced screws 75, one of which is shown, threaded into the plate 71 at one end, with the head at the opposite end set flush with the right face of the plate 52. Surrounding the screws 75 between the plates 52 and 71 are sleeves 76 and it will readily be apparent that a lateral thrust of the plate 71 in response to a similar movement of the collar 60 will be transmitted to the plate 52 through the sleeves 76.

Means is provided for setting the friction plates 28 and 29 whereby a predetermined driving force will be exerted upon the spool 40, which, as will be explained hereinafter, determines the tension exerted upon the tape during the serving thereof. This means will now be described. Adjustably carried in the dovetail channel 63 of the nut 62, as is clearly apparent from the detail view thereof (Fig. 4), are a pair of stops 77 and 78, which, in the rotation of the nut 62 through the operation of the handle 66 counter-clockwise or clockwise respectively (Fig. 1), limit the extent of movement of the handle, the stop 77 engaging a housing 79 of the stationary spring pressed plunger 64, while the stop 78 normally engages the dog 65. The stop 77 is used for setting the plates to give a maximum driving force when the serving head is first set in motion, while the stop 78 is used to give a minimum driving force between the plates after the serving head has attained the desired speed. A suitable scale or set of indications 80 formed upon the periphery of the nut 62 (Fig. 2) serves to facilitate the correct positioning of the stops 77 and 78 in the channel 63. The correct position of the stops 77 and 78 with respect to the scale 80 for different frictional driving pressures between the plates 28 and 29 having been previously determined, by experiment.

At times in the operation of the machine it may be found desirable to exert a driving force on the plates between the maximum and minimum limits, in which case the spring pressed plunger 64 acting against the wall of the channel 63 serves to hold the nut and handle at the set position.

The ring 16 supports upon its right face near the periphery thereof a plurality of freely rotatable guide rollers 83, over which the tape is led from the supply spool 40, and then to a guide pulley 84 suitably sup-

ported upon the stationary axis of the uppermost guide roller. The guide pulley 84 is angularly adjusted so that the tape is led to the core 13 at the desired angle. Associated with each of the rollers 83 is a guard pin 85 which serves to prevent the tape from leaving the guide rollers, which under certain operating conditions might happen. Counter weights (not shown) are mounted on the ring 16 at points diametrically opposite the rollers 84 or at other positions afforded by openings 87 to properly balance the serving head in a well known manner.

The serving head, comprising the sleeve 15, ring 16, rollers 83, pulley 84 and nozzle 49, and a capstan (not shown) for drawing the core through the serving head are direct connected so that the ratio between the two in revolutions per minute is constant.

The operation of the serving head hereinbefore described and embodying the improved tape tension regulating mechanism is as follows:

The core 13 to be served is threaded from a supply (not shown) through the bore 12 of the spindle 11, through the nozzle 49 and to the capstan (not shown). The core is given several turns around the capstan after which it is fed to a take-up reel (not shown). A spool 40 of tape 41 is then properly positioned and secured to the carrier 27 and the end of the tape is then led over the rollers 83 and guide roller 84 into the nozzle 49, after which it is given several turns about the core. The machine is now ready to operate and in starting it, the handle 66 is first moved forward until the stop 78 engages the housing 79 which as hereinbefore mentioned provides the desired maximum frictional contact between the plates 28 and 29. The main clutch (not shown) of the machine is then gradually engaged whereupon the spindle 11 is caused to rotate and thereby in a manner hereinbefore described through the frictional contact between the plates 28 and 29, the spool 40 will be caused to rotate at approximately the same speed as the serving head and in the same direction as indicated by the arrow in Fig. 1 until the head is running at full speed. The purpose of imparting a maximum driving force to the spool at the beginning of the serving operation is to overcome the inertia of a loaded spool of metallic tape which weighs substantially eighty pounds. The spool is thereby caused to rotate with the serving head with gradual acceleration until it attains full speed and thus prevents what is generally known as "over-running" of the spool which may cause entanglement of the tape.

As the core 13 is advanced through the serving head by the rotation of the capstan, the spool of tape is revolved in a counter-

clockwise direction with the serving head, but at a necessarily slower speed as will readily be apparent due to the drawing in a clockwise direction of the tape from the
 5 spool as it is wrapped on the advancing wire by the revolving serving head. This difference in speed, or drag, between the spool and head, furnishes the tension on the tape and it will readily be apparent that by increasing the driving force of the head upon the
 10 spool through the friction plates 28 and 29, that the tension on the tape will be correspondingly increased or vice versa.

Upon the head attaining full speed, the
 15 operator moves the handle 66 gradually back to its normal position, as shown in the drawings, with the stop against the dog 65. As hereinbefore explained, the frictional contact between the plates 28 and 29 is thus
 20 reduced to a minimum value for which the mechanism has been adjusted. At this position, which is the running position, the driving force exerted upon the spool should be sufficient to provide a tension of approximately eight ounces.

An operator by observing the tape upon the served core after it has emerged from the nozzle 49 can immediately determine, by
 30 observing its looseness or tautness, whether it is being applied with the desired tension, and if it is too loose the handle is moved forward which thereby increases the driving force applied to the spool and consequently the tension upon the tape is also increased.

A modified form of serving head is illustrated in Figs. 5 and 6, which is especially applicable to the serving of wire composed of magnetic loading material spirally to a
 40 traveling core. The spool of wire 40 is driven from the spindle 11 by a friction clutch in a manner identical with that described in connection with the serving head illustrated in Figs. 1 and 2, so that the tension on the wire during the serving thereof
 45 may be readily controlled. The wire is led from the supply spool over a plurality of freely rotatable guide rollers 90 carried by the head sleeve 15, and then to a guide pulley 91 supported upon a bracket 92 carried upon the inner wall of a guard 93
 50 which is secured to the periphery of the serving head sleeve 15 and rotatable therewith. From the pulley 91 the wire is led over a second pulley 94 also supported upon the bracket 92 and then through a guide eye or hook 95 carried upon the spindle adjacent the axis thereof and onto the core 13, where in the operation of the serving head in the manner hereinbefore described it will
 60 be wrapped spirally on the advancing core.

What is claimed is:

1. In a serving machine, a rotatable element having an aperture through which a
 65 core passes, a material supply reel associated with said element, means positioned cen-

trally of the supply reel through which power is communicated to said supply reel from said element, and adjustable means operable during the rotation of the supply
 70 reel for controlling said means to alter the amount of power communicated to said reel.

2. In a serving machine, a rotatable element having an aperture through which a core passes, a member carrying a large
 75 amount of quite heavy material, means positioned centrally of the material through which power is communicated to said member from said element, and means for changing the relationship between said means and said element to vary the amount of power
 80 communicated thereto in accordance with the inertia of said member.

3. In a serving machine, a rotatable spindle having an aperture through which a core passes, a member carrying a supply of
 85 material to be served on said core, means through which power is communicated from said spindle to said member, an element capable of movement through an arcuate path, and mechanism moved longitudinally
 90 upon the movement of said element for regulating the pressure applied to said means to vary the amount of power communicated to said member.

4. In a serving machine, a rotatable
 95 spindle having an aperture through which a core passes, a member carrying a supply of material to be served on said core, a friction clutch comprising a plurality of friction disks, adjacent ones of said disks being
 100 associated with said spindle and said member, respectively, for communicating power from said spindle to said member, an element capable of movement through an arcuate path, and mechanism responsive to
 105 the movement of said element for regulating the frictional contact between said friction disks for varying the tension applied to the material served from said member.

5. In a serving machine, a rotatable spindle having an aperture through which a core passes, a member carrying a supply of
 110 material to be served on said core, means positioned centrally of the supply of material for communicating power from said spindle to said member, and means operable manually during the serving of said material for adjusting the action of said means to vary the tension applied to said material.

6. In a serving machine, a rotatable element having an aperture through which a core passes, a member carrying a supply of
 120 material to be served on said core associated with said element, means comprising a plurality of friction disks through which power is communicated from said element to said member, and means operable during the rotation of said member for varying the degree of association of said friction disks to
 125 vary the tension applied to said material. 130

7. In a serving machine, a rotatable element having an aperture through which a core passes, a material supply reel associated with said element carrying a supply of material to be served on said core, means comprising a plurality of friction disks interposed between said element and said reel through which power is communicated thereto, mechanism operable during the rotation of said supply reel for varying the pressure applied to said disks, and means responsive to the operation of said mechanism for releasing the pressure of said friction disks to vary the tension applied to said material as it is being served on said core.

8. In a serving machine, a rotatable spindle having an aperture through which a core passes, a material supply reel carrying a supply of material to be served on said core, anti-friction bearings for said supply reel, means for communicating power between said spindle and said supply reel, and mechanism for changing the relationship of said bearings with respect to said means to regulate the power communicated to said supply reel whereby the tension applied to the material served on said core is varied.

9. In a serving machine, a rotatable spindle having an aperture through which a core passes, a material supply reel, means for securely locking said supply reel in position comprising a plurality of projecting members, means for releasing said members simultaneously to permit the removal of said reel, means through which power is communicated between said spindle and said supply reel, and mechanism operative for varying the relationship between said means and said spindle for varying the tension applied to the material served on said core.

10. In a serving machine, a rotatable spindle having an aperture through which a core passes, a material supply reel, means through which power is communicated from said spindle to said reel comprising a plurality of interleaved elements, said means causing the spindle and reel to rotate in the

same direction, means for withdrawing material from said supply reel in a direction opposite to its direction of rotation, and mechanism for regulating the action of said interleaved elements to cause them to cooperate to overcome the initial inertia of said reel.

11. In a serving machine, a rotatable spindle having an aperture through which a core passes, a material supply reel, means comprising a plurality of friction disks, adjacent ones of which are associated with said spindle and said reel, respectively, for communicating power between said spindle and said reel, an element rotatable through an arcuate path, mechanism responsive to the movement of said element for regulating the pressure applied to said friction disks and consequently the tension applied to the material served from said reel, and means effective upon the movement of said element in a predetermined direction for causing the release of the pressure applied to said friction disks.

12. In a serving machine, a rotatable spindle having an aperture through which a core passes, a material supply reel, means comprising a plurality of friction disks, adjacent ones of which are associated with said supply reel and said spindle, respectively, for communicating power between said spindle and said reel, an element having one of its ends threaded, said element being capable of rotation through an arcuate path, a non-rotatable member having a threaded portion associated with the threads of said element, and means operated upon the rotation of said element which results in the longitudinal movement of said mechanism for varying the action of said friction disks and consequently the tension applied to the material served from said reel.

In witness whereof, I hereunto subscribe my name this 13th day of November A. D., 1925.

HERBERT FRED CARTER.