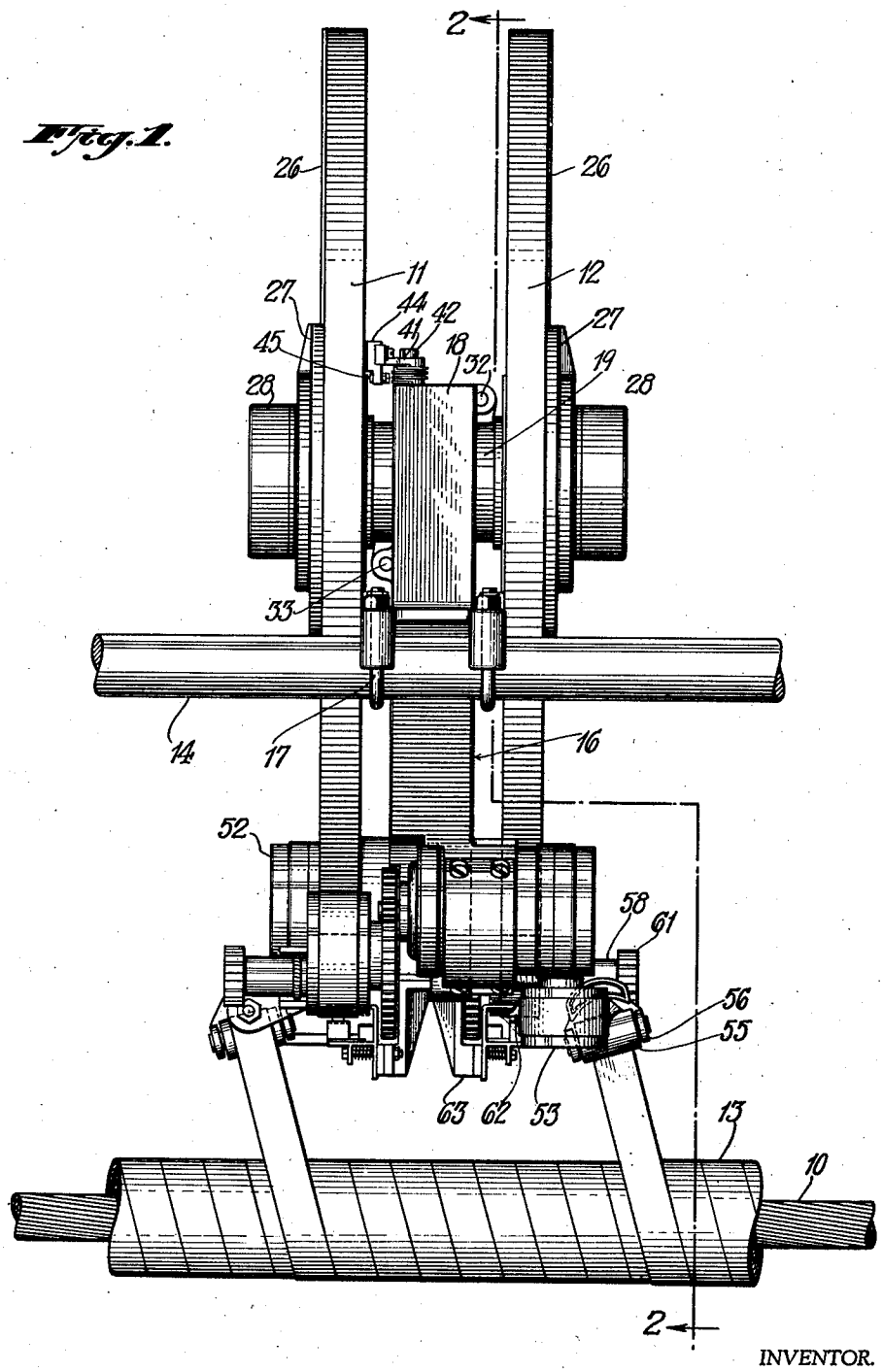
May 21, 1940. L. R. MacLEOD 2,201,238

TAPING MECHANISM

Filed May 17, 1939 4 Sheets-Sheet 1

Fig. 1.



INVENTOR.

BY LESTER R. MACLEOD.

Benj. T. Rauber ATTORNEY.

May 21, 1940. L. R. MacLEOD 2,201,238

TAPING MECHANISM

Filed May 17, 1939 4 Sheets-Sheet 2

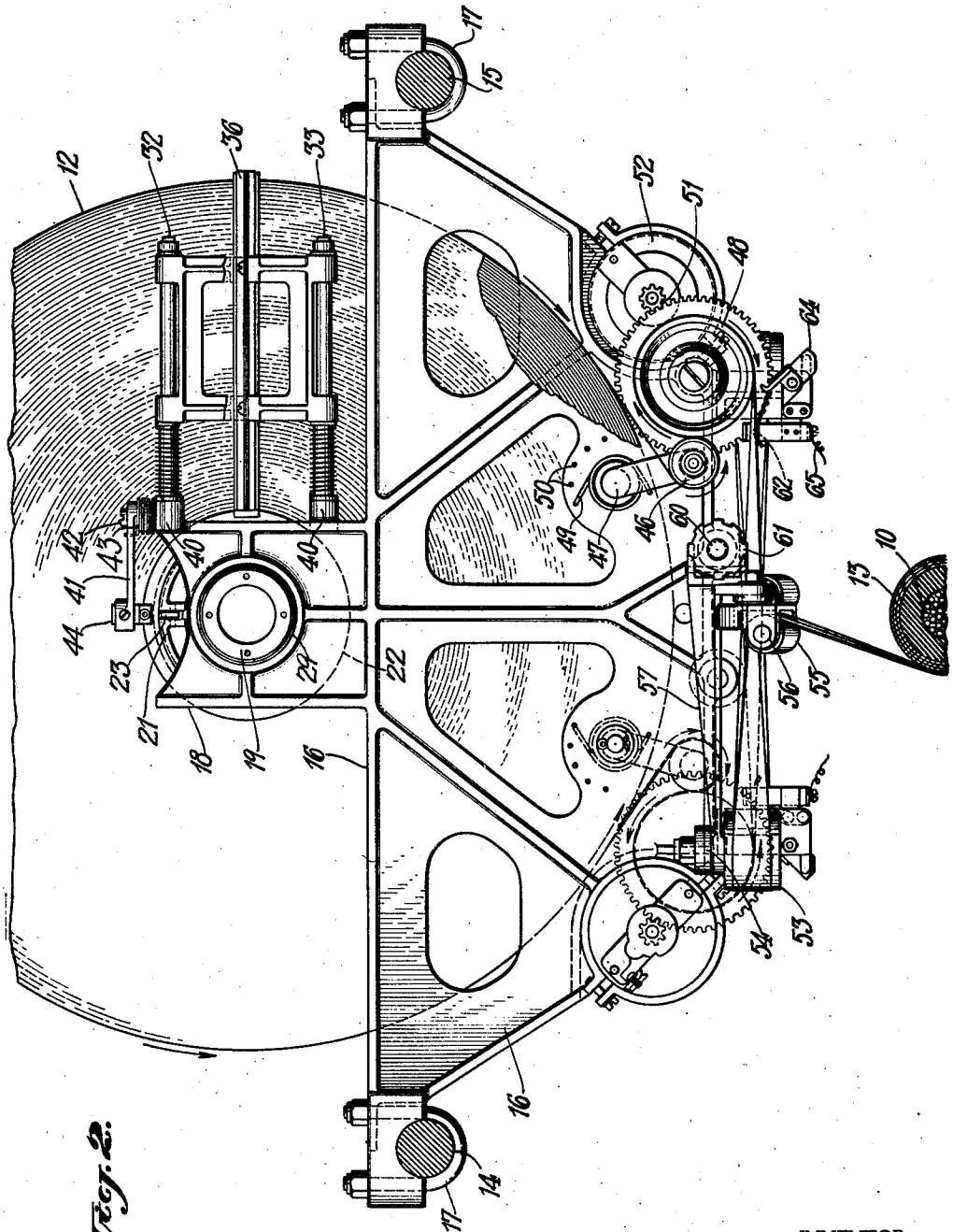


Fig. 2.

INVENTOR.
LESTER R. MACLEOD.
BY
Benj. T. Rauber ATTORNEY.

May 21, 1940. L. R. MacLEOD 2,201,238

TAPING MECHANISM

Filed May 17, 1939 4 Sheets-Sheet 3

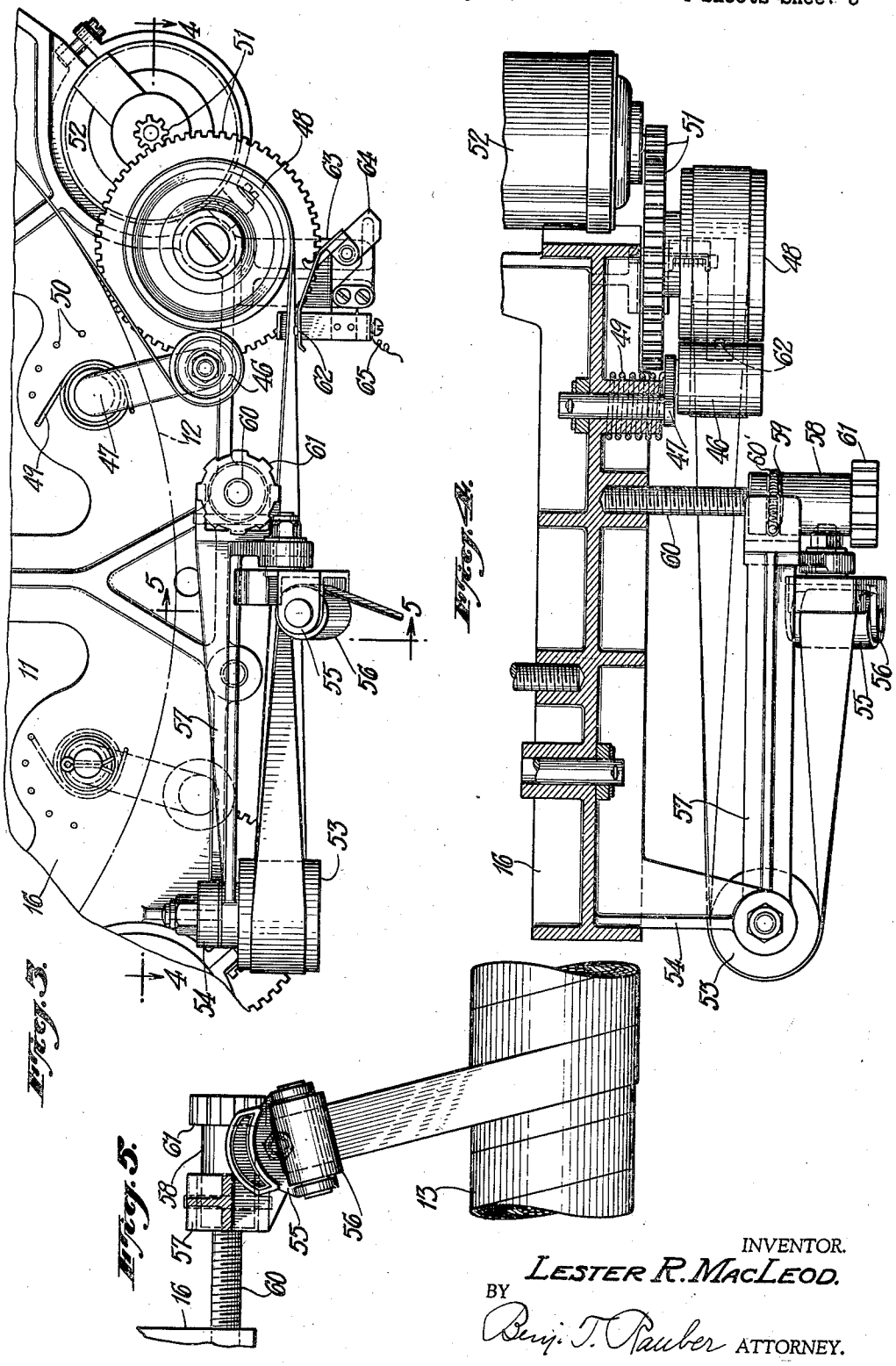


Fig. 3.

Fig. 4.

Fig. 5.

INVENTOR.
LESTER R. MACLEOD.
BY
Benj. T. Rauber ATTORNEY.

May 21, 1940. L. R. MacLEOD 2,201,238

TAPING MECHANISM

Filed May 17, 1939 4 Sheets-Sheet 4

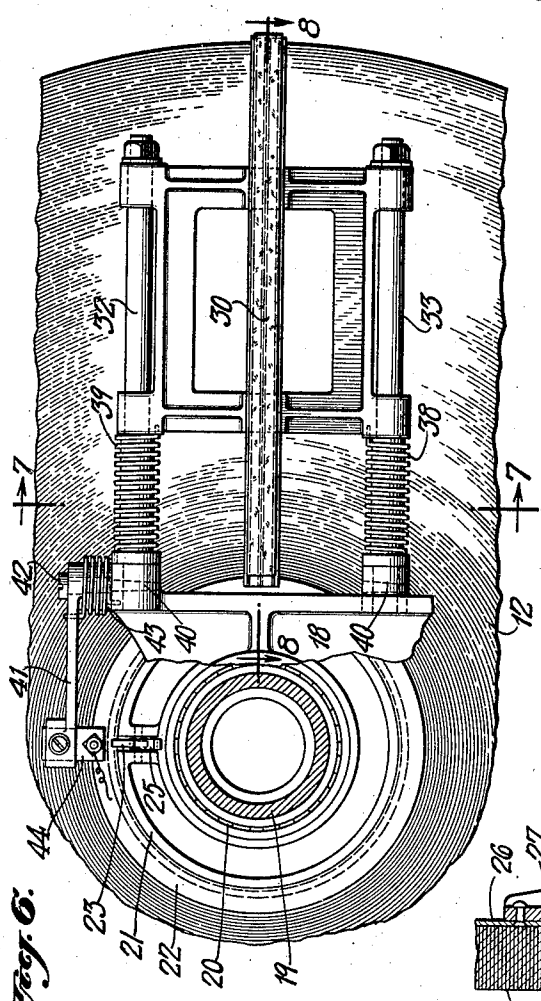


Fig. 6.

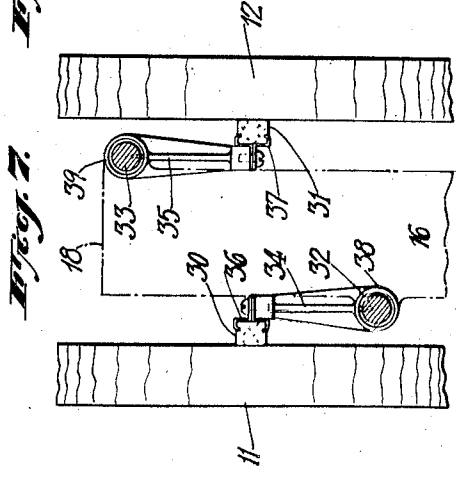


Fig. 7.

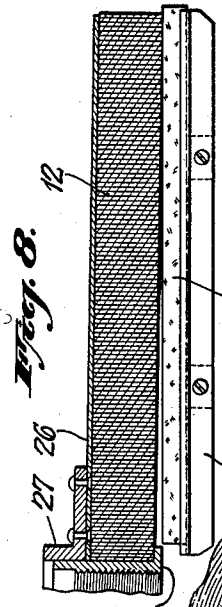


Fig. 8.

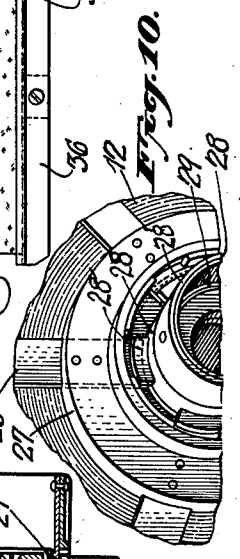


Fig. 10.

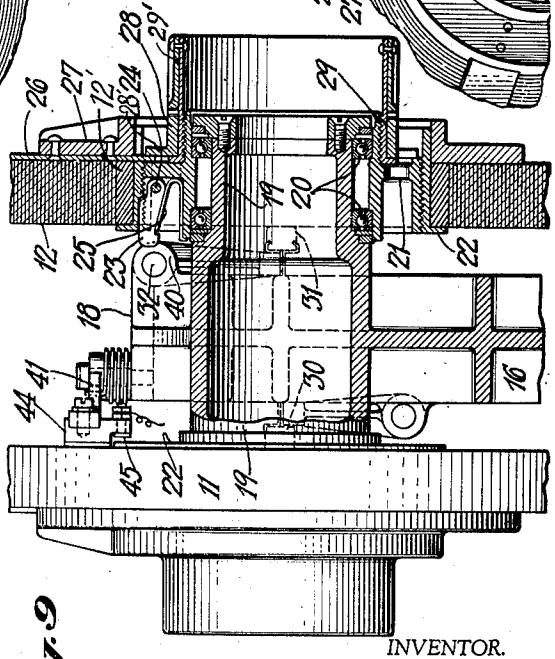


Fig. 9.

INVENTOR.
LESTER R. MACLEOD.
BY Benj. T. Rauber ATTORNEY.

Patented May 21, 1940

2,201,238

UNITED STATES PATENT OFFICE

2,201,238

TAPING MECHANISM

Lester R. MacLeod, Ardsley, N. Y., assignor to Anaconda Wire & Cable Company, New York, N. Y., a corporation of Delaware

Application May 17, 1939, Serial No. 274,093

14 Claims. (Cl. 57—15)

My invention relates to a taping mechanism, and more particularly to a mechanism for wrapping tape, such as paper tape, onto an electrically conductive wire or cable under substantially uniform tension.

A taping mechanism of the above general type is disclosed in my Patent No. 2,043,051 granted June 2, 1936.

My present invention provides an improved friction tensioning means acting on a roll of supply tape, and improvements in the means for mounting the roll of tape and for leading the tape to the cable on which it is to be wound, whereby these various mechanisms may be mounted in a compact, easily accessible arrangement and may be readily adjusted.

The various features of my invention are illustrated by way of example in the accompanying drawings, in which—

Fig. 1 is a view of a taping mechanism taken from a plane parallel to the axis of the wire or cable to be wrapped with tape.

Fig. 2 is a view, partly in section, on the line 2—2 of Fig. 1 taken at right angles to that of Fig. 1.

Fig. 3 is a side view similar to that of Fig. 2, but on a larger scale, of the lower part of the roll of tape and the mechanism for drawing the tape therefrom.

Fig. 4 is a section of a taping mechanism taken on the line 4—4 of Fig. 3.

Fig. 5 is a section taken on the line 5—5 of Fig. 3.

Fig. 6 is a section on a plane parallel to that of Fig. 2 and showing the friction tensioning means on a larger scale than that of Fig. 2.

Fig. 7 is a section taken on the line 7—7 of Fig. 6.

Fig. 8 is a section taken on the line 8—8 of Fig. 6.

Fig. 9 is a section taken on the axis of the tape rolls or pads, and

Fig. 10 is a perspective view of a detail of the mechanism.

The embodiment of my invention illustrated in the accompanying drawings shows a pair of tape pads mounted to supply a cable to be wrapped. It will be understood that there may be any desired number of such mechanisms all of which may rotate uniformly about the cable, or may be in stationary positions about a cable rotating on its own axis. In the drawings the mechanism for rotating the taping mechanism about the axis of the cable, or for rotating the cable itself, is not illustrated as any of the common mechanisms for this purpose may be employed and they do not form a part of the present invention.

During the relative rotation of the mechanism with respect to the axis of the cable to be wrapped, the tape is drawn from a rotatable pad or a pair of pads on the mechanism onto the cable and is wrapped thereon. As the tape pad is rotated by the drawing of the tape from it, the tape is tensioned by the application of friction which retards the rotation of the tape supplying pad. In order to maintain the tension constant and uniform for all diameters of pads and to avoid variations due to centrifugal action, a friction element is applied to the side of the pad immediately adjacent the edge of the pad and, therefore, independently of its diameter. This friction element comprises an arm or rod extending radially adjacent one face of the pad and inclined towards it so as to bear against the side of the pad near its periphery, regardless of the diameter of the pad. The friction element is held against the pad by spring actuated swinging arms.

The tape drawn from the pads passes about rollers which are acted upon by a small motor driven in a direction opposite to that of the passage of the tape, and then twists through an angle of 90° and passes over an idler roller from which it is led through a guide roller, and thence passes to the cable. The guide roller is adjustably mounted so that it may be moved axially towards, or from, the pad so that the tapes from a pair of pads may be spaced a desired distance apart. The guide roller is pivoted on an axis coinciding with the median line of the tape being led to it so as to adjust its position to any given spacing.

It is therefore possible with the above mechanism to space a pair of tapes for any desired purpose as, for example, to break joints, and to do this without changing the position of the parts preceding the guide roller.

Referring more particularly to the accompanying drawings, the tape wrapping mechanism is spaced a short distance from a wire or cable 10 to be wrapped so that a relative rotation of the mechanism and cable will cause tape to be drawn from a pair of tape pads or rolls 11 and 12 and wrapped on the cable to form a covering or sheath 13. The mechanism for supporting the pads 11 and 12 when guiding tape from them to the cable 10, is supported on a pair of rods 14 and 15 suitably spaced by a plate 16 secured to the rods by any suitable means, such as the U-bolts 17. The plate 16 may be of suitable

flanged construction so as to combine lightness and strength.

Mounted on an upright part 18 of the plate 16 is a shaft 19 which projects from opposite sides of the plate and forms a support for the rotating tape pads. On the projecting ends of the shaft 19 are mounted anti-friction or ball bearings 20, there being two for each projecting end. On the outer raceway 21 of the ball bearing 20 there is mounted a supporting hub 22 for the pads 11 or 12, respectively. The raceway 21 is hollowed for the sake of lightness, and its outer peripheral surface is provided with screw threads onto which the hub 22 may be threaded. The raceway 21 is also provided with a latch 23 pivoted at 24 and pressed by a spring 25 to swing outwardly and engage in a slot in the inner edge of the hub 22 so that the hub will be prevented from rotating or coming loose.

The pads 11 and 12 are wound on suitable hollow cores such as indicated at 12' on Fig. 9. The respective pad and its core are pressed tightly against a flange of the supporting hub 22 by means of a plate or a number of radiating or radial fingers 26 mounted on an annular ring 27. The fingers 26 project radially inwardly past the ring 27, and these ends are engaged by outwardly projecting pins or rings 28' of a ring 28 mounted on a collar 29 which is threaded onto the outer raceway of the anti-friction or ball bearings 20. The ring 28 is held on the collar 29 by means of an outer ring 29', Figs. 9 and 10.

To remove a pad or its hollow core and replace it with a new one, the ring 28 may be rotated to release the pins 28' from the inward projections of the fingers 26. Then the ring 28 may be rotated to move the pins 28' out of alignment with the inner projections of the fingers 26, and the ring 27 and core may be removed. When a new pad is placed on the hub, the ring 27 and fingers 26 may be shoved in position past the pins 28', the latter moved to align with the inner projections of the fingers 26 and then tightened in position. This permits a pad to be very quickly and easily replaced.

It will be apparent that pads of different thicknesses may be employed inasmuch as the threading of the collar 29 onto the outer raceway permits suitable adjustments to be made.

Friction brakes 30 and 31 respectively, are applied to the inner surface of each pad, that is, the surface opposite from that in contact with the plate 26. These friction brakes each comprises a rod or an elongated block of some suitable friction material, such as cork, the blocks being preferably of rectangular cross section so as to present an unvarying friction surface throughout the wearing of the blocks. The friction blocks 30 and 31 are held in an approximately radial position and incline towards the faces of their respective pads so as to bear against these faces near the outer edges of the pads.

For this purpose a pair of posts 32 and 33, one for each of the friction blocks 30 and 31 respectively, project sideways from the upstanding part of the plate 16 and spaced slightly sidewise of their respective friction blocks. Rotatably mounted on the posts 32 and 33, respectively, are arms 34 and 35 which, at their free ends, carry holders 36 and 37 for the friction blocks 30 and 31, respectively. The arms 34 and 35 are swung inwardly towards their respective tape pads 11 and 12 by means of springs 38 and 39, respectively, encircling the posts 32 and 33 and secured at one of their ends to their respective arms 34 or 35 and, at their opposite ends, to projecting studs 40 on the extension 18. The holders 36 and 37 are slightly inclined with respect to the arms 34 and 35 to hold the friction blocks 30 and 31 at a very slight angle with, or converging towards, the surface of their respective pads 11 and 12 as indicated in Fig. 8. Thus the blocks 30 and 31, respectively, press against the side faces of the pads only near their outer peripheries. As the pads decrease in diameter by the withdrawal of the tape, the friction blocks are pressed inwardly towards the pads by the springs 38 and 39 so as to maintain the blocks in frictional engagement with the side faces of the pads near their periphery.

The action of the friction blocks 30 and 31 on the pad is effective until substantially all of the tape is withdrawn. When only a few turns of tape are left on the core, however, the machine is stopped by suitable mechanism. In the embodiment shown, this mechanism comprises an arm 41 pivoted in a stud 42 of the extension 18 and having its free end pressed against the side face of the pad 11 or 12 by means of a coil spring 43, one end of which is engaged in the stud 40, and the other of which bears against the arms 41. The outer end of the arm 41 carries a head 44 which rests against the face of the pad 11 or 12, but which swings inwardly when the pad is exhausted so as no longer to form a support and thereupon closes an electric contact between the hub 22 of its respective pad and a contact terminal 45. Through the closing of the circuit any suitable stopping mechanism may be actuated.

The tape being drawn from a pad, such as the pad 12, passes about an idler pulley 46 carried on a swinging arm 47 which, in turn, is pivoted on the plate 16 and presses against a tensioning pulley 48 by means of a coil spring 49, one end of which acts against the arm and the other of which is anchored in one of a series of openings 50 in the plate 16. The tape passes between the idler pulley 46 and the tensioning pulley 48 and is thereby tightly pressed against the tensioning pulley. Then it passes about the pulley in tight frictional engagement therewith and the pulley is, in turn, geared by means of gearing 51 to a tensioning motor 52 applying torque in a direction opposite to the movement of the tape. Consequently, in passing over the pulley 48, tension is applied to the tape by the torque of the motor 52 acting in the opposite direction.

After passing about the idler pulley 48, the tape passes to and about a reversing pulley 53 supported by a bracket 54 on the plate 16 and with its peripheral face, onto which the tape is delivered, in alignment with the median plane of the pulley 48. The tape is thus given a 90° twist in passing from the pulley 48 to the reversing pulley 53, but moves in a straight line tangent to both pulleys and in their median planes. From the reversing pulley 53 the tape passes to a guide pulley 55. The pulley 55 is mounted on a swivel 56 the pivotal axis of which is tangent to the outer face of the reversing pulley 53, so that in any position of the pulley 55, there is a straight tangential passage of the tape from the pulley 53 to the pulley 55. The swivel 56 of the pulley 55 is, in turn, mounted on an arm 57 pivoted to swing on the axis of the pulley 53 so as to be movable to or from the pad 12. The arm 57 is swung and held in any desired position of adjustment by means of a nut 58 having a groove rotatably engaged by a pin 59 on the end of the

arm 57, and threaded onto a pin 60 mounted in the plate 16. A spring 60' frictionally restrains rotation of the nut 58. The nut 58 may be rotated by means of a knurled knob 61, and thus the position of the guide pulley 55 may be adjusted inwardly or outwardly of the pad 12. In this way the respective guide pulleys for the pads 11 and 12 may be adjusted to any desired spacing, regardless of the distance apart of the pads themselves, or of any irregularities due to warping or misalignment of the pads on their respective hubs. It will be understood that both of the pads 11 and 12 may be provided with guide and tension mechanism of the above type.

To provide for stopping the mechanism in the event of breakage of the tape, a spring pressed lever arm 62 may be provided on a bracket 63 depending from the plate 16 bearing against the tape and counter-balanced against centrifugal force by a weight 64 at its free end. Upon breakage of the tape the arm is swung upwardly to close or open a circuit between a conductor 65 and ground to control the stopping mechanism.

In the operation of the above mechanism it will be apparent that a relative rotation of the pads 11 and 12 about the cable, either when the cable remains stationary or when the pads remain stationary and the cable rotates, will cause strip material to be drawn from the outer periphery of the pads around the pulley 46 and thence about the tensioning pulley 48 to the reversing pulley 53, thence over the guide pulley 55 to the cable. The strip material is tightly pressed against the peripheral surface of the pulley 48 and its movement is opposed by the motor 52 which is geared to the pulley 48 and has a torque opposing the rotation of the pulley by the strip material. The strip material passes from the pulley 48 to the reversing pulley 53 in a straight line tangential to both pulleys and is given a 90° twist, then passes in a reverse direction to the guide pulley 55. The guide pulley 55 is free to swing transversely relative to the reversing pulley 53 without moving the strip transversely of the pulley, as would be the case if it took strip directly from the tensioning pulley 48.

Consequently the guide pulley 55 may be given any desired transverse adjustment by turning the knob 61 and nut 58 on the threaded pin 60, thus swinging the arm 57 to which the nut 58 is attached by the encircling spring 59, and thus moving the swivel 56 which is mounted on the arm 57 and carries the guide pulley 55. This permits the strip to be guided from the guide pulley 55 onto the cable 10 at any desired distance or space sidewise of the pads 11 and 12 and enables the pads to be positioned at a variable distance or, to vary in distance from the guide pulley 55 or, to enable pads of different thickness to be employed and yet permit the strip to be guided onto the cable at any desired spacing.

The tensioning pulley 48 applies the desired tension to the strip but, in order to prevent overrunning of the pads upon stoppage of the mechanism and to supply the strip material through the tensioning pulley at a desired initial tension, the cork or friction blocks 30 and 31 supply a relatively slight, but constant, pressure against the side face of their respective pads and at that part of the face immediately adjacent the peripheral edge. As the pads decrease in size, the friction blocks 30 and 31 are maintained in contact with the sides of the pads by the springs 38 and 39 so that a constant peripheral friction or tension is maintained. Owing to the fact that there is a trailing friction on the friction blocks, they tend to lie with uniform friction, and without chattering, against the sides of the pads.

In the operation of the apparatus as described above, the friction blocks 30 and 31 and the tensioning motor 52 have been described as acting simultaneously and with additive effect. However, in case a pad of narrow tape is employed, the friction blocks 30 and 31 may be sufficient and the motor 52 may be thrown out of operation and the machine used without it.

What I claim is—

1. Tensioning mechanism which comprises means to support a pad of strip material to rotate as said material is unwound, a non-rotating friction block extending in a radial direction adjacent one face of said pad, a supporting arm to hold said block inclined towards the peripheral edge of the face of said pad and swinging in a plane intersecting the radial dimension of said block, and means to press said arm resiliently towards said pad.

2. Tensioning mechanism which comprises means to support a pad of strip material to rotate as said material is unwound, a non-rotating friction block extending in a radial direction adjacent one face of said pad, a supporting arm pivoted at one side of said pad to hold said block inclined towards the peripheral edge of the face of said pad, and a spring to press said arm resiliently towards said pad.

3. Tensioning mechanism which comprises means to support a pad of strip material to rotate as said material is unwound therefrom, a non-rotating block of cork extending in a radial direction adjacent one face of said pad, a holder for holding said cork, a supporting arm pivoted in advance of said pad to hold said holder and block of cork inclined towards the peripheral face of the edge of said pad, and means to press said arm resiliently towards said pad.

4. Tensioning mechanism which comprises means to support a pad of strip material to rotate as said material is drawn therefrom, a non-rotating friction block extending in a radial direction adjacent one face of said pad, a supporting post approximately parallel to said block, an arm pivoted on said post and supporting said friction block inclined towards the peripheral edge of the adjacent face of said pad, and means to swing said arm towards said pad.

5. Mechanism for tensioning and supplying tape to a taping mechanism which comprises means for rotatably supporting a pad of strip material, a tension roller in the plane of said pad to receive strip material therefrom, a reversing roller spaced from and on an axis at a right angle to that of said tension roller and to receive strip material therefrom and give it a quarter turn, a guide roller to receive strip material from said reversing roller, and means to move said guide roller in an arc centered on the axis of said reversing roller.

6. Mechanism for supplying and tensioning tape which comprises means for rotatably supporting a supply pad of strip material, a tension roller approximately in the plane of said pad to receive strip material therefrom, a reversing roller spaced from and on an axis at right angles to that of said tension roller to receive strip material therefrom and give it a quarter turn about its length, a guide roller to receive strip material from said reversing roller, an arm pivoted on the axis of said reversing roller and supporting said guide roller, and means to swing

and hold said arm to different positions of adjustment.

7. Mechanism for supplying and tensioning tape which comprises means for rotatably supporting a supply pad of strip material, a tension roller approximately in the plane of said pad to receive strip material therefrom, a spring pressed roller bearing against the surface of said tension roller, a reversing roller spaced from and on an axis at right angles to that of said tension roller to receive strip material therefrom and give it a quarter turn about its length, a guide roller to receive strip material from said reversing roller, an arm pivoted on the axis of said reversing roller and supporting said guide roller, and means to swing and hold said arm to different positions of adjustment.

8. Mechanism for supplying and tensioning tape which comprises means for rotatably supporting a supply pad of strip material, a tension roller approximately in the plane of said pad to receive strip material therefrom, an electric motor geared to said tension roller and having a torque opposed to movement of said strip, a reversing roller spaced from and on an axis at right angles to that of said tension roller to receive strip material therefrom and give it a quarter turn about its length, a guide roller to receive strip material from said reversing roller, an arm pivoted on the axis of said reversing roller and supporting said guide roller, and means to swing and hold said arm to different positions of adjustment.

9. Mechanism for supplying and tensioning tape which comprises means for rotatably supporting a supply pad of strip material, a tension roller approximately in the plane of said pad to receive strip material therefrom, a reversing roller spaced from and on an axis at right angles to that of said tension roller to receive strip material therefrom and give it a quarter turn about its length, a guide roller to receive strip material from said reversing roller, a swivel pivoted on an axis extending toward said reversing roller and supporting said guide roller, an arm pivoted on the axis of said reversing roller and supporting said swivel and guide roller, and means to swing and hold said arm to different positions of adjustment.

10. Mechanism for supplying and tensioning tape which comprises means for rotatably supporting a supply pad of strip material, a tension roller approximately in the plane of said pad to receive strip material therefrom, a reversing roller spaced from and on an axis at right angles to that of said tension roller to receive strip material therefrom and give it a quarter turn about its length, a guide roller to receive strip material from said reversing roller, and means to move said guide roller to different positions transverse to the delivery of strip metal.

11. Mechanism for supplying and tensioning tape which comprises means for rotatably supporting a supply pad of strip material, a tension roller approximately in the plane of said pad to receive strip material therefrom, a reversing roller spaced from and on an axis at right angles to that of said tension roller to receive strip material therefrom and give it a quarter turn about its length, a guide roller to receive strip material from said reversing roller, an arm pivoted on the axis of said reversing roller and supporting said guide roller, a threaded pin extending transversely between said tension roller and said reversing roller, and a nut on said pin secured to said arm to move said arm to different positions of adjustment.

12. Mechanism for supplying and tensioning tape which comprises means for rotatably supporting a supply pad of strip material, a plate having fingers extending inwardly, a retaining ring rotatable co-axially with said plate and said pad and having fingers spaced to abut the inwardly projecting fingers of said plate, or movable to offset said fingers and permit said plate to be removed.

13. Mechanism for supplying and tensioning tape which comprises means for rotatably supporting a supply pad of tape, a plate abutting one side of said tape and having radially spaced projections extending towards the center of said plate, a rotatable ring having radially projecting fingers to engage the inwardly projecting fingers of said plate and rotatable to abut or to an offset position relative to the inwardly projecting fingers of said plate, and screwthreaded rotatable means to tighten said ring against said fingers.

14. Mechanism for supplying and tensioning tape which comprises means for rotatably supporting a supply pad of strip material, a plate having fingers extending inwardly, a retaining ring rotatable co-axially with said plate and said pad and having fingers spaced to abut the inwardly projecting fingers of said plate, or movable to offset said fingers and permit said plate to be removed, friction blocks to bear against the face of said pad opposite said plate, and swinging arms carrying said friction blocks at a slight inclination towards the outer periphery of said pad and resiliently pressed towards said pad.

LESTER R. MacLEOD.