Dec. 3, 1935. J. A. CAMERON 2,023,165

WINDING MACHINE

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Fig-3

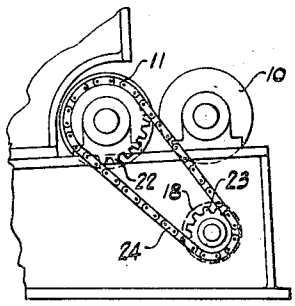

Fig-1

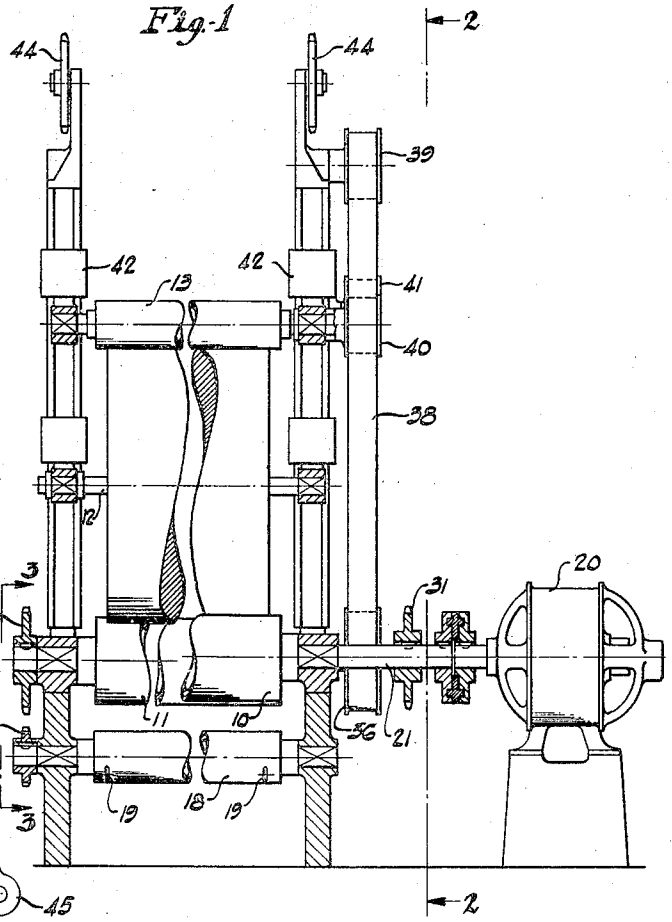

Fig-2

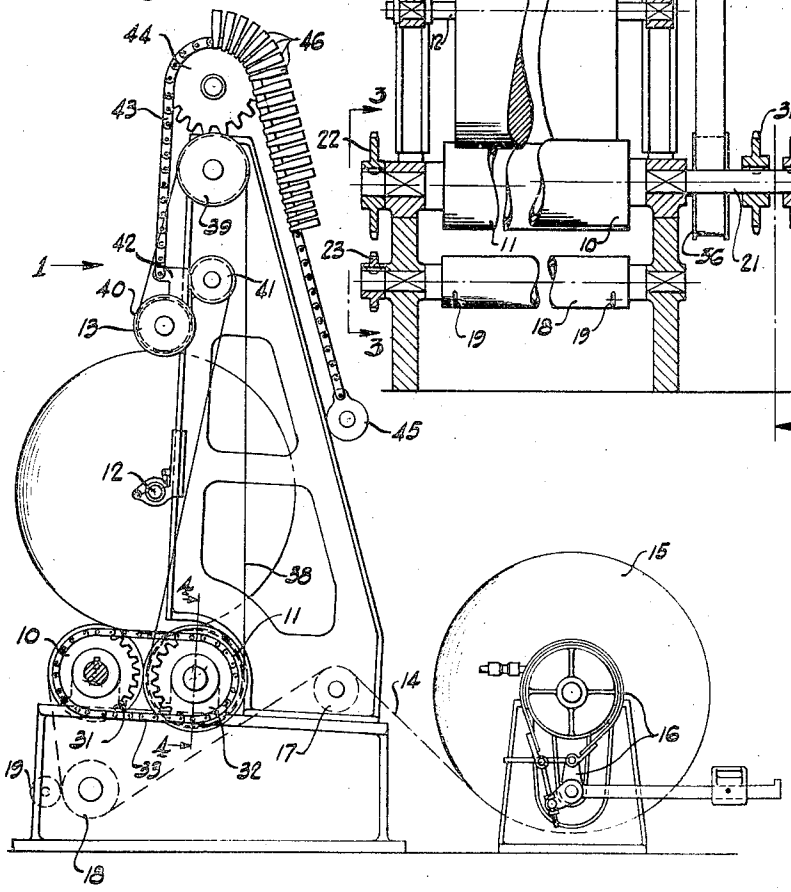

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Fig.-4

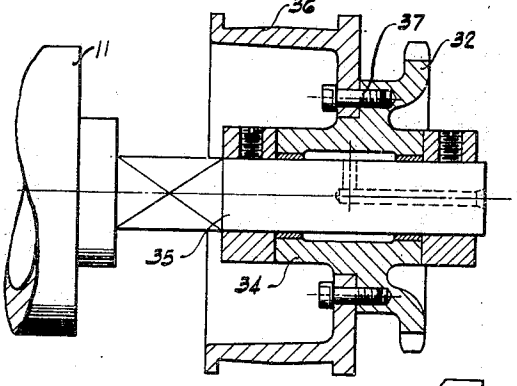


Fig.-8

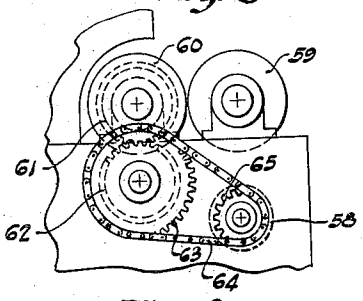


Fig.-5

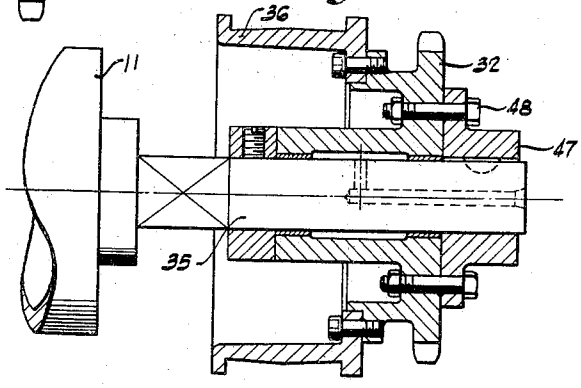


Fig.-6

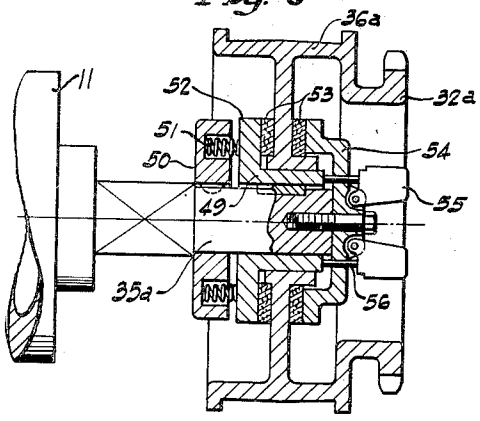


Fig.-7

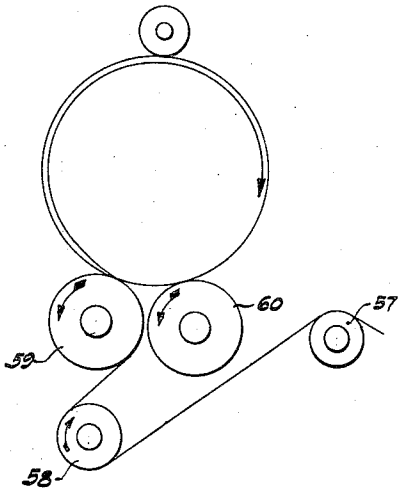
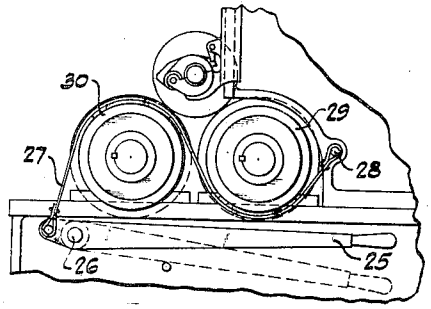


Fig.-9



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Patented Dec. 3, 1935

2,023,165

UNITED STATES PATENT OFFICE

2,023,165

WINDING MACHINE

James A. Cameron, Brooklyn, N. Y., assignor to Cameron Machine Company, Brooklyn, N. Y., a corporation of New York

Application July 13, 1933, Serial No. 680,241

9 Claims. (Cl. 242—66)

The present invention relates to winding machines or to slitting and winding machines, and has for its main object and feature a closer interrelation between the feeding and the winding, and/or the slitting and the winding of the web or webs of flexible material.

In the accompanying drawings the invention is disclosed in several concrete and preferred forms in which:

Fig. 1 is a view looking in the direction of arrow 1 of Fig. 2, with parts broken away and in section, of one form of winding or winding and slitting machine embodying the invention;

Fig. 2 is a view in elevation, and partly in section substantially on the plane of line 2—2 of Fig. 1;

Fig. 3 is a detail view looking in the direction of arrows 3—3 of Fig. 1;

Fig. 4 is a sectional detail view substantially on the plane of line 4—4 of Fig. 2;

Fig. 5 is a view similar to Fig. 4, but showing a modified form of the invention;

Fig. 6 is a view similar to Figs. 4 and 5 but showing a still further modified form of the invention;

Fig. 7 is a diagrammatic view showing a different method of threading the web through the machine;

Fig. 8 is a detail view similar to Fig. 3 but showing the gear arrangement used in connection with the arrangement of Fig. 7; and

Fig. 9 is a detail view showing the use of a brake in connection with the invention.

The type of winding machine chosen as an example of machines to which the invention can be applied consists of two winding drums 10 and 11 rotating in the same direction and supporting in the valley between them a winding shaft 12 on which the wound material is carried. If desired a riding or top pressure roller 13 may also be used. Web 14 comes here from a mill roll 15 provided with a brake 16 and is led over one or more guides as 17, around feed roll 18 to front winding drum 10 and thence to winding shaft 12. As is usual, the winding shaft and riding roller are displaceable in an upward direction in response to the accumulation of wound material on the winding shaft. Feed roll 18 may be, and here is, the backing roll of a slitting device, of which roll 18 constitutes one element and score-cut slitters 19 the other element.

Front winding drum 10 is driven from any suitable source of power, such as motor 20 which is here shown coupled directly to shaft extension 21 of said front drum. Rear drum 11 is driven by frictional contact with the wound material, but is connected with feed roll 18 by suitable transmission means such as sprockets 22 and 23 and chain 24 (Fig. 3).

When power is applied to front drum 10, the rotation of the latter tends to move the web, this action also being assisted by the tendency of winding shaft 12 to rotate especially when a driven riding roller is employed. The mill roll and its brake and the frictional resistance of guide 17, roll 18 and rear drum 11 tend to oppose the urge of front drum 10, and if this opposing force is stronger than the urge to move the web, then front drum 10 will slip with respect to the web and the latter will stand still. The tension on the web will thereby be increased and presently roll 18 or rear winding drum 11 will start to rotate and the web will begin to move. It is immaterial whether theoretically roll 18 or rear drum 11 is the first to move because either one will drive the other as will be apparent and will continue in synchronism throughout the winding operation. It is believed that rear winding drum 11 controls the winding operation to a greater extent than does the front winding drum, and therefore the web should not be fed faster or slower to the rear winding drum than the speed at which the latter is able to take it up. By controlling the speed of roll 18 from the rear winding drum, it will be understood that the web is fed at the correct speed to the front winding drum, and therefore said front winding drum will feed said web at the correct speed to the rear winding drum. Further it will be seen that the speed of the slitting device, if used, will be in synchronism with the winding action of the rear drum and with the speed of the web. In acting upon certain materials, this is of the greatest importance because the above-mentioned control of the feed of the web tends to produce a uniformly dense roll of material, and if the slitting device is employed this interrelation also tends to promote good slitting. To complete this control during the slowing down of the machine, it is desirable to use a brake (Fig. 9) which here consists of a lever 25 pivoted at 26 and connected to one end of a brake band 27 anchored at 28 and trained in S-formation over brake drums 29 and 30 carried by the winding drums. It will be seen that by applying the brake the speed of the two winding drums and of the feed roll is decelerated uniformly and that therefore the speed of the web and the speed of winding is maintained in synchronism. If a slitting device is used it will also, due to the control exercised by the

rear winding drum, be prevented from racing during the slowing down of the machine, and to prevent this is of the greatest importance in order to obtain good, clean slitting.

As has been indicated above, the rear winding drum need not be driven at all except by friction of the wound material, but if desired there may be an initial urge imparted to the rear winding drum by rotation of the front winding drum, in which case the construction presently to be described may be employed, which construction also embodies means for driving the riding roller. Carried on the shaft of front winding drum **10** is a sprocket **31** that transmits motion to sprocket **32** of the rear winding drum by means of chain **33**. Sprocket **32** (Fig. 4) is carrried by hub **34** which is free to rotate on the shaft **35** of drum **11**, there being nevertheless a frictional urge between hub **34** and shaft **35**. This frictional urge helps to start the rear winding drum at the beginning of the operation and also transmits a practically negligible amount of power during the winding operation. In the present case a pulley **36** is bolted to sprocket **32** as at **37**, and a belt **38** is trained over this pulley, thence over pulley **39** on the framework, over pulley **40** on the riding roller, over pulley **41** on slidable riding roller carriage **42** and thence back to pulley **36**. In this manner the riding roller is driven at all times from front winding drum **10**. Riding roller carriage **42** is here carried by a flexible connection **43**, that passes over sprocket **44** at the top of the machine, and has a counterweight **45** attached to its other end. Also there may be used additional weights **46** on connection **43** which at the beginning of the winding operation tend to overweight the riding roller and winding shaft to thereby press the latter more firmly against the winding drums but which, as the wound material increases in diameter and the riding roller rises tend to counterbalance and lighten the load in a manner well understood.

It is sometimes desired to drive both winding drums positively and in order to do this, the modification shown in Fig. 5 may be employed in which a flanged collar **47** is keyed to shaft **35** and bolted at **48** to sprocket **32**. With this construction both drums may be driven, or by removing bolts **48** only the front drum and the riding roller are driven.

In Fig. 6 is shown a speed-controlled clutch for the shaft of the rear winding drum, which clutch is thrown out when the parts have attained a given speed. As there indicated sprocket **32***a* and pulley **36***a* are mounted to rotate loosely on sleeve **49**, which latter is slidably keyed on shaft **35***a* of the rear winding drum. Mounted fast on shaft **35***a* is an abutment member **50** in which springs **51** are anchored, which springs press against flange **52** of sleeve **49** and tend to engage friction surfaces **53** between pulley **36***a* and end cap **54**, which latter is bolted to the end of shaft **35***a*. Mounted on end cap **54** and therefore rotating with shaft **35***a* are centrifugal weights **55** which engage pins **56** of sleeve **49**. It will now be seen that, at the beginning of the winding operation sprocket **32***a* will drive shaft **35***a* because springs **51** will cause the clutch to engage. As the speed of the gear winding drum increases, weights **55** will swing outwardly on their pivots and by pushing against pins **56** will move sleeve **49** endwise in opposition to the action of springs **51** thereby throwing out the clutch and permitting the rear winding drum to be driven by the wound material.

In Fig. 2 is shown one method of threading the web, but it will be readily understood that the web may be otherwise led through the machine. In Fig. 7 is shown a diagram in which the web is led over guide roller **57**, thence over feed roll **58**, in between winding drums **59** and **60** and over winding drum **59**. In this instance it will be seen that the feed roll rotates in a direction opposite to that of the winding drums. In order therefore to drive feed roll **58** from winding drum **60** and vice versa, a slightly different arrangement of gearing is required. As shown in Fig. 8, drum **60** is provided with a gear **61** that meshes with another gear **62**. Rotating with gear **62** is a sprocket **63** that is connected by means of chain **64** with sprocket **65** on roll **58**.

I claim:

1. In a winding machine, two winding drums rotating in the same direction to support, in the valley between them, wound flexible web material; a roll to feed flexible material to one of said drums; means to drive the drum to which the material is fed by the roll; and interconnecting transmission devices, independent of the first-mentioned drum, between the other drum and the roll.

2. In a winding machine, two winding drums rotating in the same direction to support, in the valley between them, wound flexible web material; means to drive one of said drums, the other of said drums being rotated by frictional contact with the wound material; a roll to feed flexible material to the driven drum; and interconnecting transmission devices between the other drum and the roll.

3. In a winding machine, two winding drums rotating in the same direction to support, in the valley between them, wound flexible web material; a roll to feed flexible material to one of said drums; means to drive the drum to which the material is fed by the roll; a riding roller to press on top of the wound material; interconnecting transmission devices between said drum and riding roller; and interconnecting transmission devices, independent of the first-mentioned drum, between the other drum and the roll.

4. In a winding machine, two winding drums rotating in the same direction to support, in the valley between them, wound flexible web material; means to drive one of said drums, the other of said drums being rotated by frictional contact with the wound material; a roll to feed flexible material to the driven drum; a riding roller to press on top of the wound material; interconnecting transmission devices between said drum and riding roller; and interconnecting transmission devices between the other drum and the roll.

5. In a winding machine, the combination of a winding drum rotated by frictional contact with the wound flexible web material it supports; a feed roll for the web; and interconnecting transmission devices between the drum and the roll.

6. In a winding machine, two winding drums rotating in the same direction to support, in the valley between them, wound flexible web material; means to drive one of said drums the other of said drums being rotated by frictional contact with the wound material; and means, governed by the rotation of said other drum, to control the feeding of the web to the driven drum.

7. In a winding machine, two winding drums rotating in the same direction to support, in the valley between them, wound flexible web material; means to drive one of said drums the other of

said drums being rotated by frictional contact with the wound material; and means, governed by the feeding of the web to the driven drum, to control the rotation of said other drum.

8. In a winding machine, two winding drums rotating in the same direction to support, in the valley between them, wound flexible web material; means to drive one of said drums the other of said drums being rotated by frictional contact with the wound material; feeding means to feed the web to the driven drum; and means to synchronize the take-up of the web by the other drum with the feed of the web by the feeding means.

9. In a winding machine, two winding drums rotating in the same direction to support, in the valley between them, wound flexible web material; a roll to feed flexible material to one of said drums; means to drive the drum to which the material is fed by the roll; interconnecting transmission devices, independent of the first-mentioned drum, between the other drum and the roll; and brake means to retard the rotation of both winding drums.

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