Dec. 17, 1929. C. W. VALENTINE 1,739,931

WINDING MACHINE

Filed Oct. 6, 1926 3 Sheets-Sheet 1

Fig. 1.

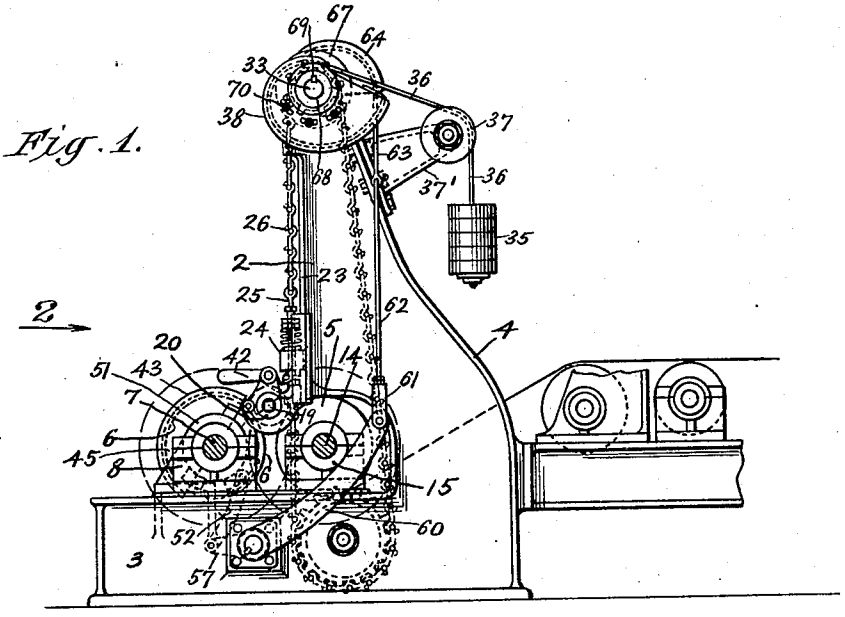
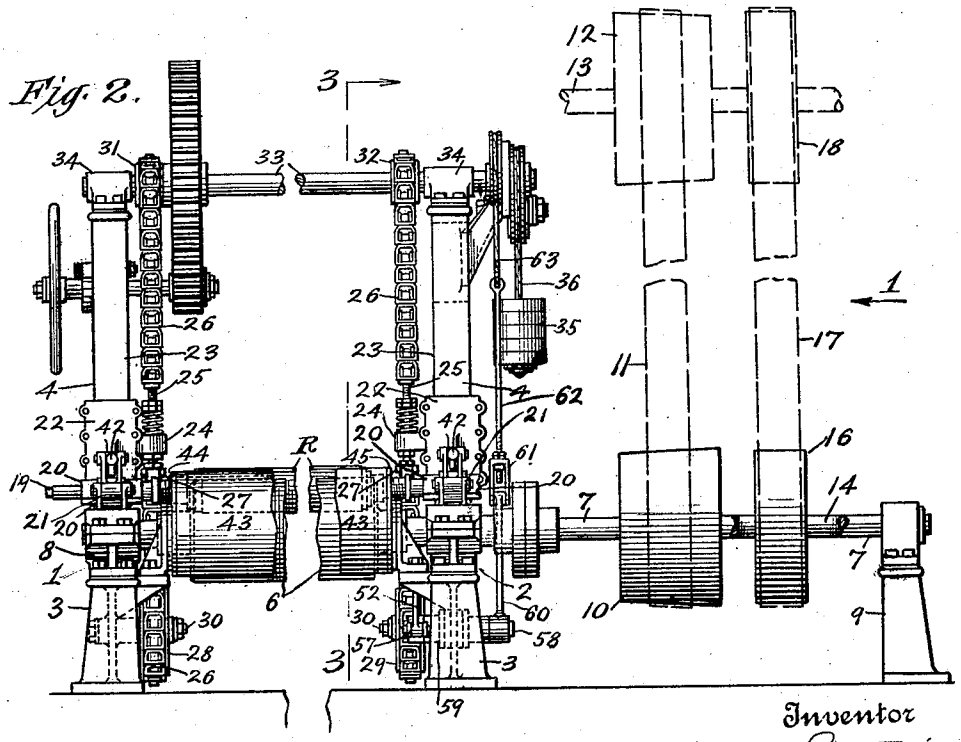


Fig. 2.



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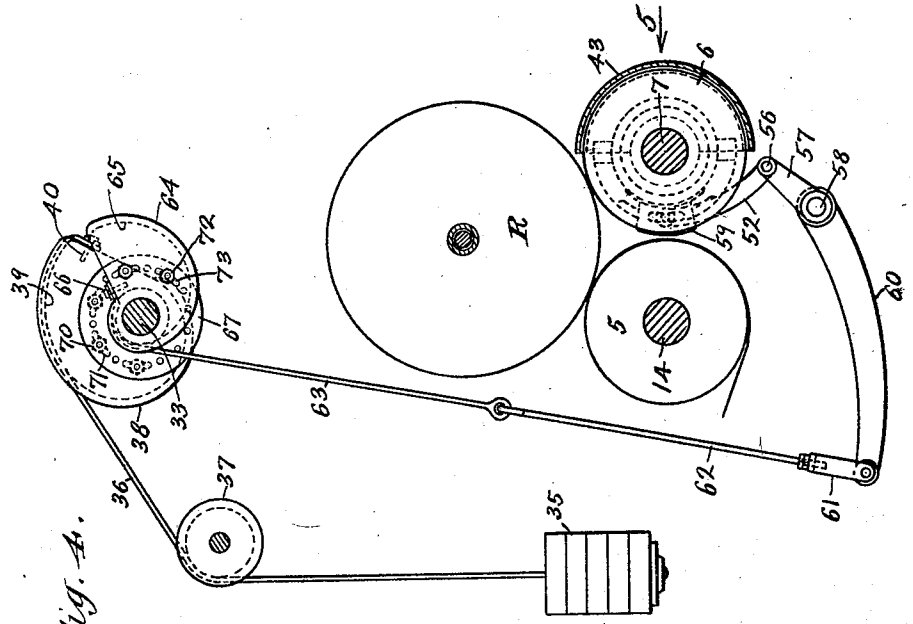


Fig. 4.

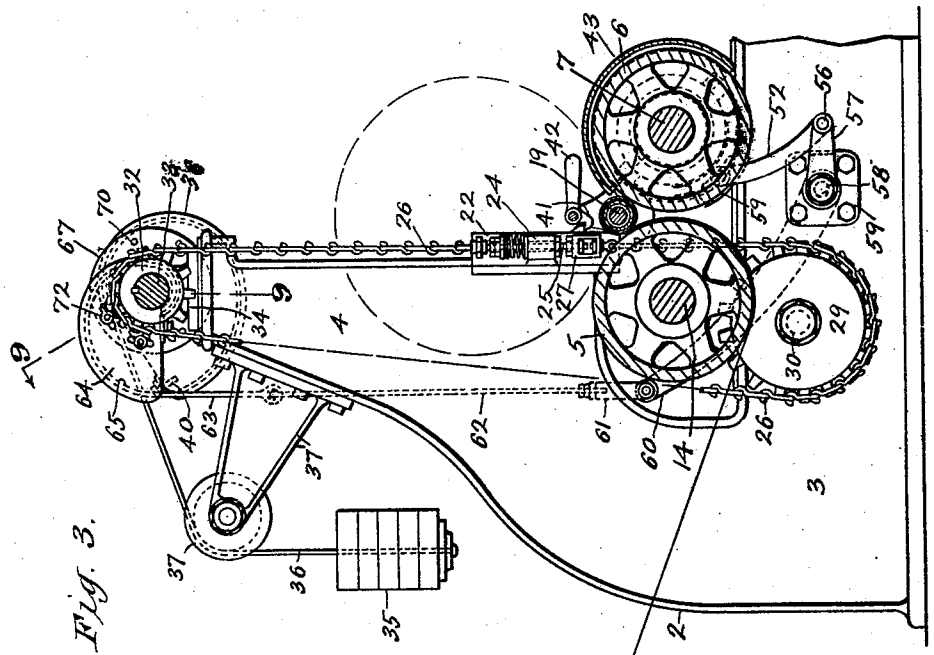


Fig. 3.

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WINDING MACHINE

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Fig. 5.

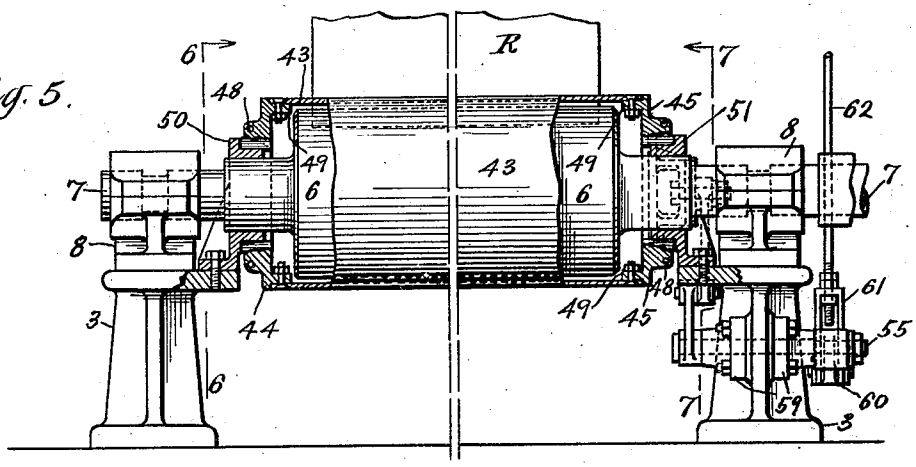


Fig. 6.

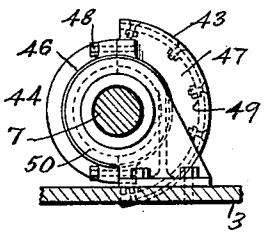


Fig. 7.

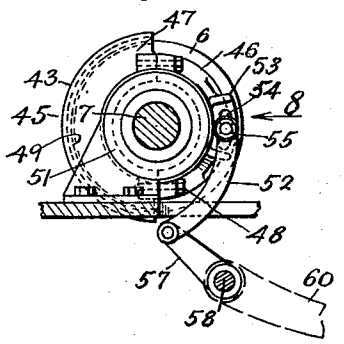


Fig. 8.

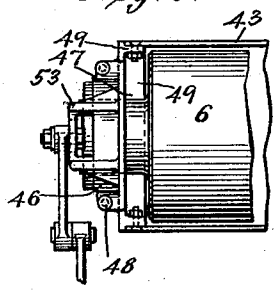
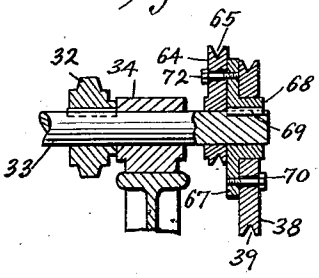


Fig. 9.



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Patented Dec. 17, 1929 1,739,931

UNITED STATES PATENT OFFICE

CHARLES W. VALENTINE, OF WATERTOWN, NEW YORK, ASSIGNOR TO THE BAGLEY AND SEWALL COMPANY, OF WATERTOWN, NEW YORK, A CORPORATION OF NEW YORK

WINDING MACHINE

Application filed October 6, 1926. Serial No. 139,786.

This invention relates to certain improvements in mechanisms for winding a continuous web of material, such as paper, into a roll.

These winding mechanisms as now generally constructed include a pair of driven drums or rolls, between the peripheries of which is a spindle on which the material to be wound is rolled by the action of the drums, the paper or other material being led in under the first drum and between it and the co-operating drum and around the spindle. As the material is wound into the roll, the roll increases in size and the spindle becomes thereby laterally displaced, and provision must be made for supporting the spindle during such displacement. The spindle for this purpose is usually carried in bearings supported on endless chains which act to elevate the spindle as the roll increases in diameter. These rolls are heavy and, as they increase in size, difficulty is experienced in effecting a proper lateral movement of the roll spindle.

It is a special object of the present invention to produce a compensating mechanism of improved design which will compensate for the variation in the weight of the roll as it grows in diameter from the start of the winding operation up to the completion of the roll.

It is a further object of the invention to produce a guard mechanism which will effectually guard the roll spindle at the start of the winding operation and will be automatically moved to maintain its desired guarding position with respect to the driving drum as the roll increases in size, and preferably this guard mechanism will be such that its position is shifted through the movement of the compensating mechanism.

With these and other objects not specifically referred to, the invention consists in certain novel parts, arrangements and combinations which will be described in connection with the accompanying drawings and the novel features pointed out in the claims hereunto annexed.

Referring now to these drawings,—

Figure 1 is an end elevation of the improved winding mechanism, the parts being shown in the position occupied at the start of the winding operation;

Figure 2 is a side elevation, partly broken away, of the construction shown in Fig. 1;

Figure 3 is a sectional elevation of the mechanism shown in Fig. 1, the section being taken on line 3—3 of Fig. 2;

Figure 4 is a view similar to Fig. 3 showing the parts in a different position;

Figure 5 is an end view, partly broken away and partly in section, on an enlarged scale of part of the mechanism shown in Fig. 2;

Figure 6 is a detail sectional view taken on line 6—6 of Fig. 5;

Figure 7 is a detail partly sectional view taken on line 7—7 of Fig. 5;

Figure 8 is a side view of the construction shown in Fig. 7 looking in the direction of arrow 8 of that figure, and

Figure 9 is a detail sectional view of part of the compensating mechanism.

Referring now to these drawings, 1, 2 indicate side frames or standards of any suitable configurations, the standards preferably having a horizontal leg 3 and a vertical leg 4. Supported in these standards are a pair of drums 5, 6, by the rotation of which the paper or other material is wound into the roll. These drums are driven drums and, in the best constructions, means are provided whereby a variation in the surface speed of one of the drums relatively to the other may be effected so as to provide a draw on the paper as it is wound into the roll, thus smoothing or ironing out the paper and causing a compact smooth winding of the paper into the roll. In the particular construction shown, the drum 6 is so arranged and, as illustrated, is carried on a shaft 7 supported in bearings 8 in the standards 1, 2, before referred to. This shaft, as shown in Fig. 2, extends beyond the machine at one side, being suitably supported at its outer end in short standards 9. This shaft is driven by a cone pulley 10 by means of a belt 11 and a cone driving pulley 12 on shaft 13 driven from any suitable source of power, not shown. By shifting the belt, the speed of the drum 6 may be varied to effect the desired draw on the paper.

The other drum 5 is mounted on a shaft 14 supported in suitable bearings 15 in the standards 1, 2, before referred to. This shaft also extends beyond the machine frame, the outer end of this shaft being supported in short standards similar to the standards 9, before referred to. This shaft 14 is driven with a constant speed by a straight faced pulley 16 and a belt 17 from a straight faced pulley 18 on the power shaft 13, before referred to.

The material, as paper, to be rolled is wound on a winding spindle or shaft 19 which, as shown in Figs. 2 and 3, is arranged to lie between the peripheries of the drums 5, 6, and with the material wound thereon is rotated by the rotation of the winding drums. This winding spindle 19 is supported in bearings 20 formed in arms 21 carried by blocks 22 which have a sliding movement in ways 23 in the upright legs 4 of the standards before referred to.

As the roll increases in size, the spindle is laterally displaced and an upward movement of the bearings is effected as this displacement takes place. In the construction shown this is effected by providing the blocks with ears or lugs 24 in which are secured spring seated bolts 25 to which are fastened one end of a pair of chains 26, the other end of the chains being secured to turn-buckles 27 threaded to the ends of the bolts 25. The chains pass over idler-sprockets 28, 29 mounted on studs 30 in the legs 3 of the standards 1, 2, before referred to, and over sprockets 31, 32 on an actuator shaft 33 mounted in bearings 34 in the upright legs 4 of the standards 1, 2, before referred to, above the winding drums. As the roll increases in size, therefore, the bearings are lifted proportionately to the increase in the size of the roll. In accordance with the invention, means are provided for compensating for the weight of the roll and the bearings of the roll and its spindle from the start of the winding operation up to the size of the roll within the capacity of the winding mechanism. While this may be effected in various ways, in the preferred construction this will be effected by a power element, the pull of this element being controlled by a compensating mechanism so that it will exert a varying pulling power depending on the weight of the roll. In the particular construction illustrated for this, there is provided a power element in the form of a weight, indicated by the numeral 35, which is hung from the free end of a cable 36 which passes over a guide sheave 37 supported in a bracket 37′ secured to the upright leg 4, before referred to. This cable passes over a sheave 38 secured on one end of the actuator shaft 33, before referred to, the end of the cable being, as best shown in Fig. 4, passed around a working groove 39 shown in dotted lines, being secured, as by a screw 40, to the face of the sheave. This sheave is fast on the shaft 33, and its working surface is a spiral curve so that as it rotates from right to left, that is, from the position shown in Fig. 3 to the position shown in Fig. 4, the radius of the spiral with respect to the shaft varies. The curve of the spiral is computed so that it will preferably counterbalance the weight of the spindle, its supporting parts and the roll from the start to the finish of the winding operation. When the spindle 19 is in starting position, the weight acts on the short radius of the sheave and exerts a pull which approximately balances the weight of the spindle and operating parts. As the roll increases in size and the operating shaft 33 rotates, the sheave is rotated with the shaft and the effective radius of the sheave is gradually lengthened. This has the effect of increasing the pulling effect of the weight and thus acts to automatically counterbalance the roll as the weight of the roll increases.

The roll spindle 19 may be locked in its bearings in any suitable manner, as by means of a latch 41 operated by a handle 42, upon the release of which the roll spindle may be lifted out of its bearings.

In machines embodying the invention in its best forms, a guard mechanism will be provided for guarding the operator from getting his hands caught between the winding rolls and the roll of material. This guard mechanism will be so constructed that it will guard one of the winding rolls, as the roll 6, at the start of the winding operation and will be automatically moved as the roll increases in size so as to allow for the proper winding of the roll, and at the same time maintain the required guarding space between the edge of the guard and the roll of material. While this may be effected in various ways, in the particular construction shown there is provided a guard plate 43 which is secured to a pair of heads 44, 45. These heads are two part heads, marked 46, 47, as shown in Figs. 6 and 7, these heads being bolted together by bolts 48. One part, as the part 47, of each of the heads is provided with a flange 49 to which the guard plate 43 is bolted. These heads are supported in the machine in any suitable manner. In the particular construction shown, the part 47 of each of the heads is supported in brackets 50, 51 suitably supported by the legs 3 of the standards 1, 2, before referred to.

Means are provided for operating these heads to move the guard as the roll increases in size and, as before stated, these means will preferably be operated from the operating shaft 33, before referred to. In the particular construction illustrated for effecting this, the heads, as the head 45, has secured to one of its parts, as the part 46, a link 52, this link being secured in a projection 53 which is formed with a slot 54, best shown in Fig. 7,

the link being adjustably secured in this slot by a bolt 55. Connected at 56 to the free end of 52 of this link is a rock arm 57 supported on a rock shaft 58 mounted in a bracket 59, see Fig. 5, secured to the leg 3 of the standard. The other end of this rock shaft has secured thereon an arm 60 which carries a link 61 to which is adjustably secured one end of a rod 62. The other end of this rod is secured to a cable 63 which passes over a sheave 64 having a working groove 65, the cable being secured to the face of this sheave, as by a bolt 66.

This sheave 64 is secured on the operating shaft 33, before referred to. This sheave 64, it will be observed, has a spiral working surface, and by suitably plotting this surface a very accurate movement of the guard relatively to the roll may be obtained. This sheave 64 and the sheave 39, before referred to, are preferably mounted so that they will operate together, the sheave 39 compensating for the increased weight of the roll, and the sheave 64 operating to shift the guard as the size of the roll increases. Furthermore, in the best constructions, means are provided for adjusting these sheaves relatively to their position on the shaft 33 and relative to each other. While this may be effected in various ways, in the particular construction shown, there is provided a plate or head 67 having a hub 68 keyed as at 69 to the shaft 33. The sheave 39 is secured by bolts 70 to the outer face of this plate, these bolts working in slots 71 so that the sheave can be adjusted on the plate. The sheave 64 is secured by bolts 72 to the inner face of this plate, these bolts working in slots 73 which provide an adjustment of the sheave relatively to the head and relatively to the sheave 39.

It will be seen that as the sheave 64 rotates from the position shown in Fig. 3 to the position shown in Fig. 4, a certain amount of cable 63 is released so that the arm 60 is free to drop, rotating the rock shaft 58 and causing a movement of the link 52 which accurately swings the guard from the position shown in Fig. 3 to that shown in Fig. 4, where it is assumed that the roll R has been wound to a size within the limits of the machine.

It will be seen that with the construction described a very accurate compensation of the weight of the roll may be obtained from the start of the winding operation until the full roll is wound, and at the same time the guard is operated to maintain a proper guarding position with respect to the wound roll.

While the invention has been shown and described in its preferred forms, it will be understood that various changes may be made in the particular construction and arrangement of the parts without departing from the invention as defined in the appended claims.

What I claim is:

1. In a machine for winding web material into a roll, the combination of winding means, a guard therefor, an actuator shaft rotated by the lateral displacement of the roll, a spiral sheave on the shaft, and flexible connections between the sheave and the guard.

2. In a machine for winding web material into a roll, the combination of winding rolls, an actuator shaft rotated by the displacement of the roll of material, a sheave cam on the shaft having a spiral working surface, a curved guard for one of the winding rolls and connections controlled by the spiral cam for shifting the position of the guard as the roll of material increases in size.

3. In a machine for winding web material into a roll, the combination of winding rolls, an actuator shaft rotated by the displacement of the roll of material, a sheave cam on the shaft having a spiral working surface, a curved guard for one of the winding rolls, a flexible cable passing over the spiral cam, and adjustable connections between the end of the cable and the guard, whereby the position of the guard is shifted as the roll of material increases in size.

4. In a machine for winding web material into a roll, the combination of winding rolls, an actuator shaft rotated by the displacement of the roll of material, a sheave cam on the shaft having a spiral working surface, a curved guard for one of the winding rolls, a flexible cable passing over the spiral cam, a lever, connections between the lever and the cable, a second lever, and a link connecting the second lever to the guard.

5. In a mechanism for winding web material into a roll, the combination of a pair of winding rolls, a winding spindle on which the material is wound by the rolls, sliding bearings for this spindle, sprockets and sprocket chains connected to the bearings, a shaft, sprockets on the shaft over which the chains pass, an operating cam on the shaft having a spiral working surface, a guard for one of the winding rolls, a flexible cable passing over the spiral cam, means for adjusting the cable and mechanical connections between the cable and the guard.

In testimony whereof, I have hereunto set my hand.

CHARLES W. VALENTINE.