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DOUBLE RIBBON MECHANISM

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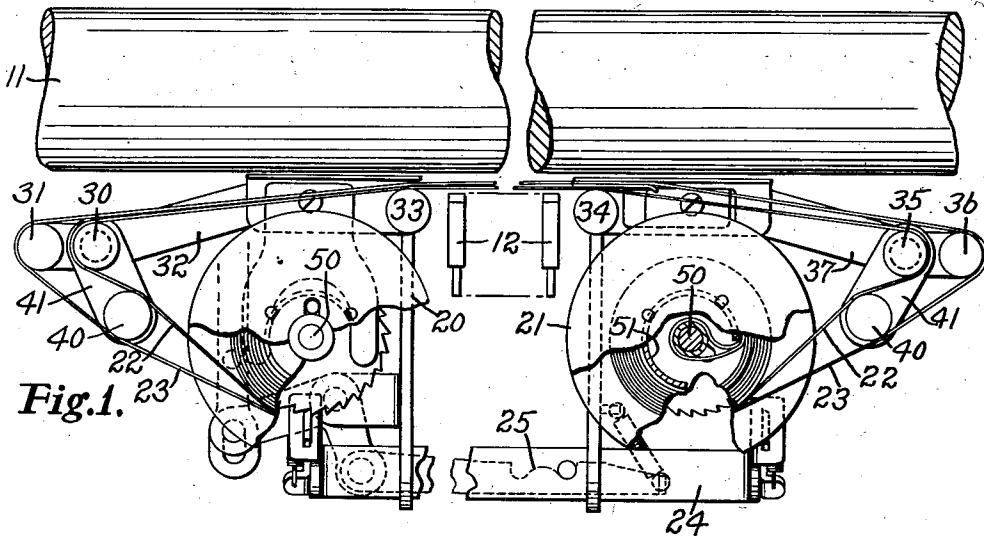


Fig. 1.

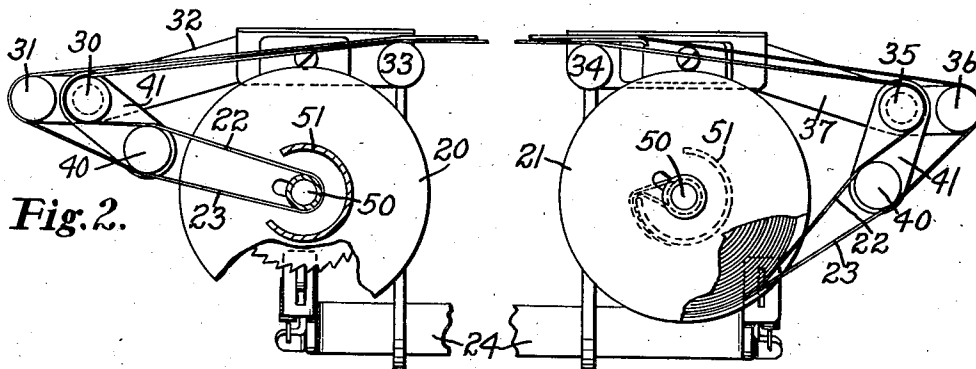


Fig. 2.

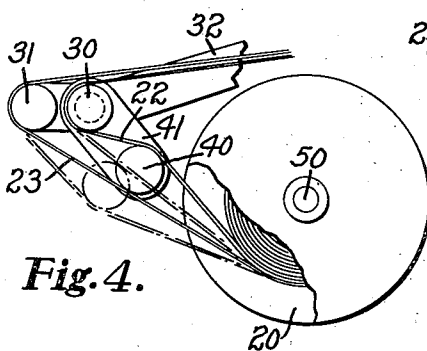


Fig. 4.

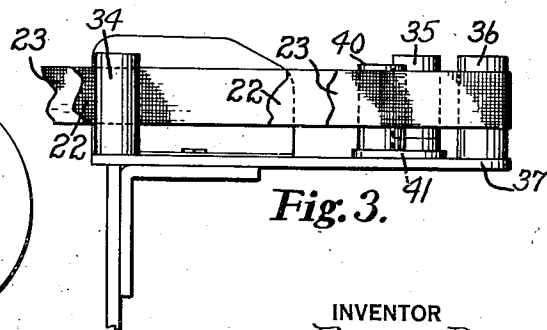


Fig. 3.

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DOUBLE RIBBON MECHANISM

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10 Claims. (Cl. 197—153)

This invention relates to a double ribbon mechanism for use on calculating machines, typewriters and the like for the purpose of making a plurality of copies of the type bar impressions without the use of carbon paper.

The invention comprehends a construction in which multiple ribbon webs are used but, instead of having a separate pair of reels for each web, only one pair of reels is used and the webs are wound from one reel to the other in superimposed relation. One of the difficulties with a construction of this kind is the keeping of the webs properly tensioned. The webs stretch differently, they tend to creep, and one of them tends to travel faster than the other, with the result that one of the ribbons may be fairly taut while the other is quite slack. This interferes with the proper operation of the machine.

The object of the present invention is to provide, in a double ribbon mechanism of the kind specified, automatic means for maintaining tension on the ribbon webs substantially equal at all times.

A more particular object is to provide an automatic tensioning means in a device of the kind described wherein the tension on one of the ribbon webs tends to automatically take up the slack in the other.

Other objects and advantages of the invention will appear from the following specification and drawing.

An embodiment of the invention is shown in the accompanying drawing in which:

Figure 1 is a partial plan view of the invention showing the parts in the position they occupy when about the same amount of ribbon web is on each of the ribbon reels.

Fig. 2 is a view similar to Fig. 1 showing the position of the parts when the ribbon webs have been unwound from one reel and completely wound on the other.

Fig. 3 is a partial or detailed front elevation of one of the automatic equalizing devices and its mounting.

Fig. 4 is a partial plan view of one of the ribbon reels showing in full lines the position of the parts when the outside ribbon web is tensioned and the inner web slackened and, in dot and dash lines the position of the parts when the inner web is tensioned and the outer web slackened.

The invention is shown applied to a calculating machine of which the platen 11 is shown in Fig. 1. This machine has a group of type bars 12 of which two are shown.

The ribbon reels 20 and 21 are employed, one

of the reels being mounted on one side of the group of type bars 12 and the other reel being mounted on the other side. The two webs of ribbon comprising an inner web 22 and an outer web 23 are led from one reel to the other past the printing line of the platen. The webs are wound from one reel to the other by means of a feeding mechanism 24 including an automatic reversing device indicated generally at 25. An understanding of the details of the ribbon feeding and reverse mechanism is not necessary for an understanding of the present invention. Any one of many well known mechanisms may be used.

Starting with the reel 20, the ribbon webs pass the respective guide posts 30 and 31, the post 30 being for the inner web 22 and the post 31 for the outer web 23, and the two posts being supported by arm 32. The two webs then pass the posts 33 and 34 from which they pass to guide posts 35 and 36, the post 35 being for the inner web 22 and the post 36 for the outer web 23, the two posts being supported by arm 37. The guide posts 30, 31, 35 and 36 serve to space the ribbon webs and to position them so that they will travel past the printing line of the platen.

It will be apparent that, if, during the travel of the webs from one reel to the other, one of them stretches more than the other, it will tend to become slack. Also, if one web tends to creep relative to the other one will become slack while the other is taut. It will also be understood that the outer web 23 travels on a slightly larger circumference than the inner web 22 and will tend to wind faster than the inner web. This causes a difference in the tension of the two webs. The effects of these different circumferences on the tension of the web varies during the winding operation in something of the following manner:

Assume that the webs are in the condition illustrated in Fig. 2 and that they are just starting to wind on the reel 20. The circumference about which the webs are being wound on reel 20 is small relative to the circumference from which the webs are being unwound from the reel 21. As is well known, the circumference of a circle varies in proportion to its radius. The radius of the drum of the reel 20 in Fig. 2 is quite small and, with such a small radius, the difference in the circumference about which the inner web is wound relative to the circumference about which the outer web is wound will be quite marked. To put it in another way, relatively speaking, the thickness of the inner web makes an appreciable

difference in the length of the radius of the circumference about which the outer web is wound on reel 20. However, where the radius is large, as on the reel 21 of Fig. 2, the slight difference caused by the thickness of the inner web does not have such a relatively great effect on the circumference about which the outer web is unwound. The result is, when winding is started as assumed for Fig. 2, the outside web tends to wind considerably faster on the reel 20 than does the inside web, and this difference in rate of winding is greater than the difference between the rate at which these two webs are unwound from the large circumference of reel 21. The result is that the outside web 23 becomes tensioned and a slack is created in the inner web 22, as shown in full lines in Fig. 4.

When the web reaches the condition of Fig. 1, there is approximately the same amount of ribbon on each reel and the two webs are wound on the reel 20 at approximately the same rate as they are unwound from the reel 21, because the radii of the circumference are about equal when the parts are in the condition shown. In practice, this condition does not always occur, because of stretching of the webs, pounding of the type and other peculiarities of fabric webs.

As the roll of ribbon on reel 20 becomes larger and the roll on reel 21 becomes smaller, the reverse action takes place, that is, the outside ribbon web 23 tends to unwind faster than the reel 21 than the inner web 22 and the difference in rate of unwinding between these webs is greater than the difference of winding on the reel 20 so that the outside web tends to slack away and the previous slack in the inner web tends to be taken up as shown in dot and dash lines in Fig. 4.

From the above it will be seen that the condition caused by one web being wound on a larger circumference than the other causes a variation in the tension of the webs which changes from time to time. In order to take care of this and in order to take care of other variations in the tension of the webs caused by stretching, creeping and the like, an automatic equalizing device has been provided which maintains the tension on the ribbon webs substantially equal at all times. In the embodiment shown, two equalizers are provided, one at each side of the machine and these will be referred to as the right and left hand equalizers. Their construction is the same.

Referring to Figs. 1 and 2 there is positioned between the ribbon webs at the right-hand side of the machine a relatively large cylindrical stud 40 whose diameter is appreciably greater than the space between the ribbon webs. The stud is carried by an arm 41 loosely pivoted on the arm 37 that supports the studs 35 and 36. The equalizer on the left-hand side is constructed and mounted in like manner. The construction is very simple and inexpensive, but it operates quite effectively to maintain the tension of the webs substantially equal.

When the tension on the webs is equal, the stud 40 occupies what may be said to be a normal or central position, that is, the two webs of the ribbon pass over the stud and deviate from a straight line about equal amounts as shown in Fig. 1. If, however, the tension on one of the webs becomes greater than that on the other or, to put it the other way, if one of the webs becomes slack, the web having the greater tension tends to push the stud 40 sidewise to take up

the slack in the other web. This action is entirely automatic and depends upon the tension of the webs. If the tensions should shift, that is, if the web that originally became slack should later become tensioned, it will push the stud in the other direction to take up the slack in the first web. It will be understood, of course, that the size of the stud can be varied so as to provide for taking up considerable slack in the web, but it has been found that this stud need not be so very large, particularly when an equalizer is provided on each side of the machine.

The equalizers above explained act effectively to maintain the tension of both of the webs substantially equal during any unwinding of the webs from one reel to the other. Further provision is made against the possibility of one of the webs creeping relatively to the other or one web stretching considerably relative to the other so that one becomes so loose that the equalizers cannot normally take up the slack. A very simple and inexpensive construction has been devised for operation in combination with the equalizers to accomplish this result.

Referring to Fig. 2, it will be observed that the ribbon is an endless one, that is, it is a single ribbon in the form of an endless loop. The ends of this loop are slipped over the supporting shafts 50 on which the ribbon reels are mounted, these supports being inside the loop. The loop then passes through an opening in the inside drum 51 of the reel and is wound around the drum so that the two webs are in superimposed relation. When the ribbon is completely unwound from one of the reels, as shown in Fig. 2, the ribbon can slip around the cylindrical shaft 50 so that the unwound portions of the ribbon can equalize themselves and the tension of the two webs becomes equal. As is well understood, the automatic ribbon reverse mechanism is caused to reverse by the tension on the ribbon webs caused by the effort of the feeding mechanism to continue to unwind the ribbon from a reel when it has been completely unwound from said reel. As the feeding mechanism places this tension on the ribbon webs, the loop will slip around the shaft 50 and the two webs will be tensioned equally while the equalizers will be moved to central or normal position. Accordingly, when the ribbon reverse operates, and the direction of winding of the webs is reversed, the start of the winding on the empty reel will be with the ribbon webs of equal tension. This means that any stretching or creeping that takes place is automatically compensated for when the ribbon is completely unwound from one of the reels which means, of course, that the automatic equalizers merely have to take care of any slack that occurs during one unwinding operation from one reel to the other. These two devices, that is the automatic equalizing means plus the construction and mounting of the ribbon operate together to take care of all conditions that arise and act to maintain the tension on the ribbon webs substantially equal.

It is to be understood that the construction shown is for purposes of illustration only and that variations may be made in it without departing from the spirit and scope of the invention as defined by the appended claims.

I claim:

1. In a machine of the class described, a pair of ribbon reels, plural webs of ribbon extending from one reel to the other, means guiding said webs past the printing line of the machine,

means for winding said webs from one reel to the other, and means for translating the tension of one web to the other for automatically maintaining the tension of said webs substantially equal while they are being wound from one reel to the other.

2. In a machine of the class described, a pair of ribbon reels, a pair of ribbon webs extending from one reel to the other, means guiding said webs past the printing line of the machine, means for winding said webs from one reel to the other and vice versa, and means governed by the tension of one web acting to automatically take up the slack in the other whereby the tension on said webs is maintained substantially equal.

3. In a machine of the class described, a pair of ribbon reels, a plurality of ribbon webs extending from one reel to the other, means for winding said webs from one reel to the other and vice versa, guides for guiding said webs adjacent the printing line of the machine, and a movable equalizer between said webs of greater width than the distance between said ribbons whereby, when one web becomes slack, the tension in the other web will move the equalizer to take up the slack in the first web.

4. In a machine of the class described, a pair of ribbon reels, a pair of ribbon webs extending from one reel to the other, means for winding said webs from one reel to the other and vice versa, a pair of guides adjacent each reel for spacing said webs and for guiding them adjacent the printing line of the machine, and a cylindrical member between said webs of greater diameter than the space between said webs, said member being mounted so that, when one of said webs becomes slack, the tension in the other web will move the member to take up the slack in the first web.

5. In a machine of the class described, a pair of ribbon reels, a pair of ribbon webs extending from one reel to the other, means for winding said webs from one reel to the other and vice versa, a pair of guides adjacent each reel for spacing said webs and for guiding them adjacent the printing line of the machine, a freely pivoted arm adjacent each reel, each arm carrying a stud positioned between the portions of the ribbon webs extending from the adjacent reels to the adjacent guide, said studs being of greater diameter than the space between said webs whereby, when the tension on one web tends to become greater than that on the other, said stud moves to automatically equalize the tension on said webs.

6. In a machine of the class described, a pair of ribbon reels mounted to rotate about supporting posts, a ribbon on said reels, said ribbon

being in the form of an endless loop with two webs of the loop extending between said reels, and means for winding said ribbon from one reel to the other and vice versa, said ribbon being wound so that the two webs thereof are in superimposed relation on said reels, said supporting posts being inside of said ribbon loop whereby, when the ribbon is unwound from one reel, the loop will adjust itself about the post of said reel to equalize the tension on the two webs of the loop.

7. In a machine of the class described, a pair of ribbon reels rotatably mounted on supporting posts, a ribbon on said reels, said ribbon being in the form of an endless loop with two webs of the loop extending between said reels, means for winding said ribbon from one reel to the other and vice versa, said ribbon being wound so that the two webs thereof are in superimposed relation on said reels, and drums on said reels about which said ribbon webs are wound, each drum having an opening therein through which the ribbon loop passes to the interior of the drum, the supporting posts being inside said drums and inside the ribbon loop.

8. In a machine of the class described, a pair of ribbon webs supported by a pair of ribbon reels, means guiding said webs past the printing line of the machine, means for winding said webs from one reel to the other, and means responsive to a difference of tension of said webs acting to automatically maintain the tension of said webs substantially equal while they are being wound from one reel to the other.

9. In a machine of the class described, a pair of ribbon reels, two webs of ribbon extending from one reel to the other, means guiding said webs past the printing line of the machine, means for winding said webs from one reel to the other and vice versa, means automatically maintaining the tension on said webs equal while they are being wound from one spool to the other, and means automatically equalizing the unwound lengths of said webs as the winding from one spool to the other is completed.

10. In a machine of the class described, a pair of ribbon reels, two webs of ribbon extending from one reel to the other, means for winding said webs from one reel to the other and vice versa, means guiding said webs past the printing line of the machine, means automatically maintaining the tension on said webs equal as they are being wound from one spool to the other, and means for attaching said webs to said reels so that the unwound lengths of webs are automatically equalized as the winding of said webs from one spool to the other is completed.

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