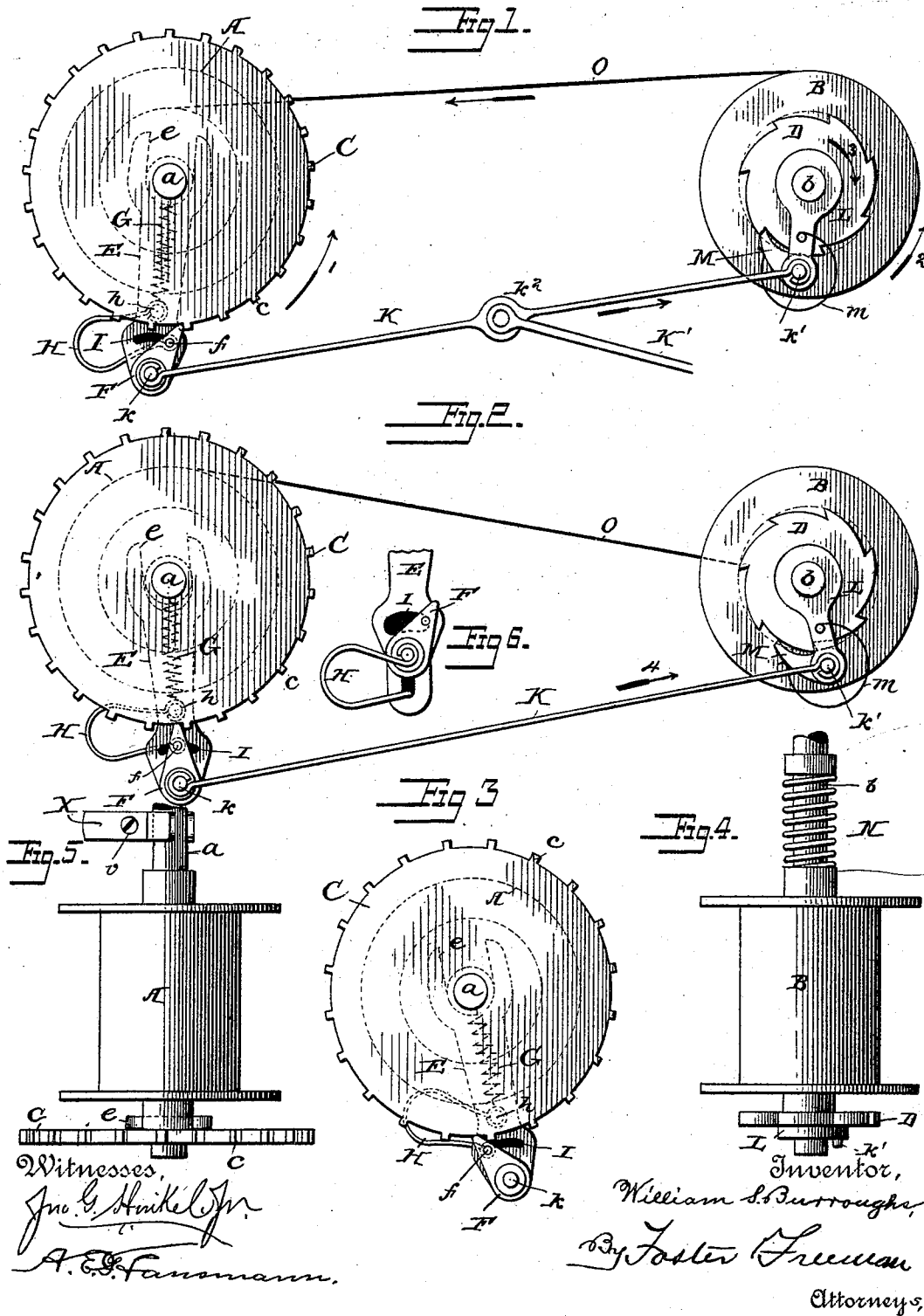


(No Model.)

W. S. BURROUGHS.
RIBBON WINDING DEVICE.

No. 396,070.

Patented Jan. 15, 1889.



UNITED STATES PATENT OFFICE.

WILLIAM S. BURROUGHS, OF ST. LOUIS, MISSOURI, ASSIGNOR TO THE
AMERICAN ARITHMOMETER COMPANY, OF SAME PLACE.

RIBBON-WINDING DEVICE.

SPECIFICATION forming part of Letters Patent No. 396,070, dated January 15, 1889.

Application filed November 22, 1887. Serial No. 255,923. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM S. BURROUGHS, a citizen of the United States, residing at St. Louis, Missouri, have invented certain new and useful Improvements in Ribbon-Winding Devices, of which the following is a specification.

This invention relates to a device for winding inking-ribbons or other slowly-moving bands from one spool or holder to another, and is applicable to machines of many different kinds—as type-writers, stamping and canceling devices, and the like—but which is particularly adapted for use upon a calculating-machine which I have invented, and for which I am about to make application for Letters Patent.

The invention consists of novel means whereby the ribbon is automatically wound back and forth between the two spools without requiring attention upon the part of the operator.

In the drawings I have not shown this invention connected with any particular machine with which it is adapted to be used, having simply shown two spools, the ribbon extending between them, and the mechanism for rotating the spools, it being understood that the printing devices, when the invention is used therewith, will be arranged in proximity to the ribbon between the spools or reels.

In the drawings, Figure 1 is a side view of sufficient devices to illustrate my invention, showing them in position to feed in the direction which I shall hereinafter designate “forward.” Fig. 2 is a similar view, showing the position of parts when reversing from feeding in one direction to the other. Fig. 3 is a similar view of one of the spools and the mechanism for rotating it in position to turn it “backward.” Fig. 4 is a plan view of the right-hand spool, Figs. 1 and 2. Fig. 5 is a plan view of the left-hand spool; Fig. 6, a view illustrating a modification.

The two spools A B, upon which the ribbon O is wound and between which it extends, are mounted, respectively, upon the shafts *a* and *b*, and each is provided with a driver for rotating it. The spool A may or may not be

fast upon its shaft, as the ratchet-wheel C, connected to or forming part of the spool, and through which rotary motion is communicated thereto, is not or is secured directly to the spool, it being only necessary that the spool A shall be adapted to and rotated positively by its driver. The spool B, on the other hand, is loose relative to its driver, consisting of a ratchet-wheel, D, and reciprocating pawl, with which driver it has a yielding or frictional connection. In the drawings I have illustrated the wheel D as being fast upon shaft *b* and the spool B loose thereon, but connected therewith by frictional engagement of a spring, N, carried by the shaft engaging with the end disk of the spool.

Inasmuch as the spool A is rigidly connected with the wheel through which motion is imparted thereto, it follows that the driving mechanism which regulates the feeding of the ribbon in both directions must be connected with said spool. At the same time there must be a driver for rotating the spool B simultaneously with the rotation of spool A when the ribbon is being fed from the spool A onto the spool B.

The driving devices for rotating both spools may receive their motion directly from a single moving element of the device, and I have so shown it in the drawings, where K represents a link reciprocated by a rod, K', the link being connected at *k k'* with arms E L, rocking, respectively, around the axes of shafts *a b* and provided with spring-actuated pivoted pawls F M, engaging with the teeth of wheels C D, respectively. When the parts are in the position shown in Fig. 1, reciprocation of the rod or link K, and by it of the arm E and pawl F, will cause a rotation of the wheel C, and with it the spool A, with a step-by-step motion in the direction of the arrow 1, while the wheel D will be rotated with a step-by-step motion in the direction of the arrow 3 thereon, but without carrying the spool B in this direction, owing to the loose connection between the two. The spool B at each movement of the spool A turns upon its shaft independent of the wheel D in the direction of arrow 2 to permit the ribbon to unwind therefrom, and when the parts are in posi-

tion to effect the movement of the ribbon in the direction of its arrow, Fig. 1, the wheel D will simply vibrate back and forth the distance it may be moved in one direction by the positive draw of the ribbon and in the reverse direction by the vibration of its pawl. The movement of this wheel D in the latter-named direction—the reverse of the paying-off movement of the spool B—owing to the frictional connection between it and the spool B and the resistance offered by the bearings of the shaft *a*, will not wind the ribbon back upon the said spool, but will move back idly. In other words, the resistance to the turning of shaft *a* is greater than the frictional resistance imparted by spring N. This resistance may be imparted to the shaft *a* by any suitable means. As shown in Fig. 5, a pair of spring-plates, X, carried by the frame-work, embrace a portion of the shaft, and a screw, as *v*, securing the plates together, may be employed to vary the amount of friction imparted to the shaft. These motions will continue until the ribbon has been entirely wound from the spool B to the spool A, when it becomes necessary, if the machine be automatic and continuously operating, to reverse the direction of rotation of the spools. The arrangement of parts by which I accomplish this I will now describe. The upper end of the arm or lever E is forked, the arms *ee* straddling the shaft *a* and permitting the lever to reciprocate with respect thereto. The bottom of the fork of this arm E is held with a yielding force against the shaft *a*, as by means of the spring G.

The lower end of the arm E, to which is pivoted the pawl F, is expanded and provided beyond the plane of the teeth *c* on the wheel C with a curved slot, I, concentric with the pivot *k* of the pawl F. Through this slot projects a pin, *f*, carried by the pawl, which serves as a means of attaching a substantially C-shaped spring, H, pivoted at its opposite end to a pin, *h*, carried by arm E and serving to hold the pawl in proper position to act upon the teeth of the wheel C, and yet permitting it to be at proper times shifted into the different positions shown in Figs. 1, 2, and 3 of the drawings.

Fig. 2 indicates the position of the parts after the ribbon has been entirely wound from the spool B upon the spool A and at the time the parts are changing their position to reverse or feed the ribbon in the other direction. The ribbon being entirely unwound from spool B and drawn taut, as indicated in Fig. 2, a motion of the link K in the direction of the arrow 4, instead of moving the arm E and wheel C together, causes the former to be moved forward relatively to the latter, which is held from further rotation by the taut ribbon O. This forward movement of the arm E and its pawl relatively to the wheel C is permitted by the outward movement or reciprocation of the arm with respect to the shaft *a* against the tension of the spring G,

and at the same time so mounting the pawl that it may rock on its axis from an inclined position on one side of the longitudinal axial line of the arm to an inclined position on the other, so that when the end of the pawl meets an unyielding obstruction, as a tooth, *c*, when wheel C is immovable, the arm will be forced away from the shaft *a* against the tension of spring G, as seen in Fig. 2, and the pawl is rocked on its pivot from a position indicated in Fig. 1 to that in Fig. 2, and then to that shown in Fig. 3, or vice versa.

The arrangement of the spring H is such that whether the pawl F is in the position shown in Fig. 1 or that shown in Fig. 3 its free end will be held against the periphery of wheel C in position to engage the teeth thereon. The position of parts being changed to that shown in Fig. 3, a continued reciprocation of the rod K will cause a backward step-by-step rotation of the spool A, unwinding the ribbon slowly therefrom, and at the same time wheel D will be turned in the same direction as it is when the parts are in the position shown in Fig. 1, which is the same direction as that now followed by spool A. The frictional or yielding connection between the wheel D and the spool B is sufficient to cause the latter to move with the wheel until all the ribbon unwound by the backward movement of the spool A has been taken up; but the relative sizes of the wheels C and D and the throw of the arms E and L are such that wheel D turns through a much greater arc at each reciprocation of the rod K than does the wheel C. This insures that the spool B shall always be turned sufficiently far to take up all slack ribbon, and should wheel D tend to turn it farther than is necessary therefor no straining will occur, as its motion will simply be arrested by the strain on the ribbon, while the wheel D and shaft *b* turn on. The parts remain in the relation shown in Fig. 3 until the entire ribbon is unwound from the spool A and onto the spool B. When this occurs, however, instead of the arm E and its pawl changing their position back to that illustrated in Fig. 1, they continue to rotate the spool in the same direction, rewinding the ribbon on the spool A, but in a convolute running around its axis in a direction opposite to that followed when the ribbon was last being unwound. This continues until the ribbon is entirely unwound from spool B, when it is again drawn taut. The position of the rotating mechanism for the spool A will then be reversed and brought into the position shown in Fig. 1, and the operations of the device described will be repeated.

Different frictional means may be interposed between the spool B and its driver D, as a rubber washer or a spring on the spool bearing on the periphery of the driver, as shown in dotted lines Fig. 1. Further, different radially-yielding supports for the pawl F may be used. For instance, its pivot-pin *k* may slide in a slot in the arm E against a spring

therein, as shown in Fig. 6, and friction dogs and disks may be substituted for the pawls and ratchets. I do not therefore wish to be limited to the exact construction which I have herein illustrated, as that will be more or less modified, without, however, departing from the spirit of my invention, as it is used upon one kind of machine or another.

Without limiting myself to the precise construction and arrangement of parts shown and described, I claim—

1. The combination of a ribbon and two spools carrying the same, a driver for each spool, one of which is a reversible driver, and both drivers connected with one operating device, and a yielding connection, substantially as described, between one of the spools and its driver, substantially as described.

2. The combination, with two spools carrying a ribbon, of a driver turning in but one direction, having a yielding connection with one of said spools, a reversible driver connected with the other said spool, and means for operating said drivers, substantially as described.

3. The combination, with two spools, of a step-by-step driver for one of the spools, a yielding connection between the driver and said spool and a reversible driver for the other spool, and means for operating said drivers simultaneously, substantially as described.

4. The combination of the two spools, ribbon, and two connected drivers, one of said drivers having a yielding connection with one of said spools, and of less diameter than the other, whereby to move the latter spool at a greater speed than the other spool, substantially as described.

5. The combination of two spools carrying a ribbon, a driver frictionally connected with one spool, a driving spring-pawl engaging with the wheel of the other spool-driver and supported on a radially-yielding bearing, and a connection, substantially as described, between said pawl and said driver, substantially as specified.

6. In a ribbon-winding device, the combination of a spool mounted upon a shaft, *a*, and having a toothed driving-wheel, a vibrating arm, a vibrating spring-actuated pawl carried by the arm, and means, substantially as described, for vibrating the arm, and a radially-yielding bearing for the pawl, substantially as described.

7. In a ribbon-winding device, the combi-

nation of spool A, mounted on a shaft, *a*, a toothed driving-wheel, a vibrating arm pivoted to the shaft and having a sliding bearing, a spring which tends to draw the arm toward the shaft, a pivoted reversible pawl carried by the arm, engaging with the teeth on the wheel, and carrying a pin projecting through a slot in the arm concentric with the pivot of the pawl, and a pivoted spring which holds the pawl in engagement with the teeth of the wheel, substantially as described.

8. The combination, with a spool, B, and frictionally-connected driver therefor, of a spool, A, and reciprocating driving-pawl having a radially-yielding support and pivoted to swing to either side, and a spring connected to press said pawl against the spool in each position, and means for operating said drivers, substantially as described.

9. In a ribbon-winding device, the combination of spools A and B, a driving-wheel, C, positively connected with the spool A, a driving-wheel yieldingly connected with the spool B and of less size than the driving-wheel of spool A, and means, substantially as described, for simultaneously turning said wheels, substantially as described.

10. In a ribbon-winding device, the combination of spools A and B, driving-wheel C, positively connected with spool A, a driving-wheel yieldingly connected with spool B and of less size than wheel C, and an intermittently-operating pawl for wheel D, tending to rotate spool B away from spool A, and a reversible pawl for the wheel C, substantially as described.

11. In a ribbon-winding device, the combination of spools A and B, toothed wheel C, positively connected with wheel A, toothed wheel D, frictionally connected with spool B, the vibrating arm carrying a reversible spring-actuated pawl for rotating wheel C, vibrating arm carrying a non-reversible spring-actuated pawl for rotating wheel D, and reciprocating devices connecting said arms for vibrating them synchronously, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM S. BURROUGHS.

Witnesses:

CHARLES E. FOSTER,
J. S. BARKER.