

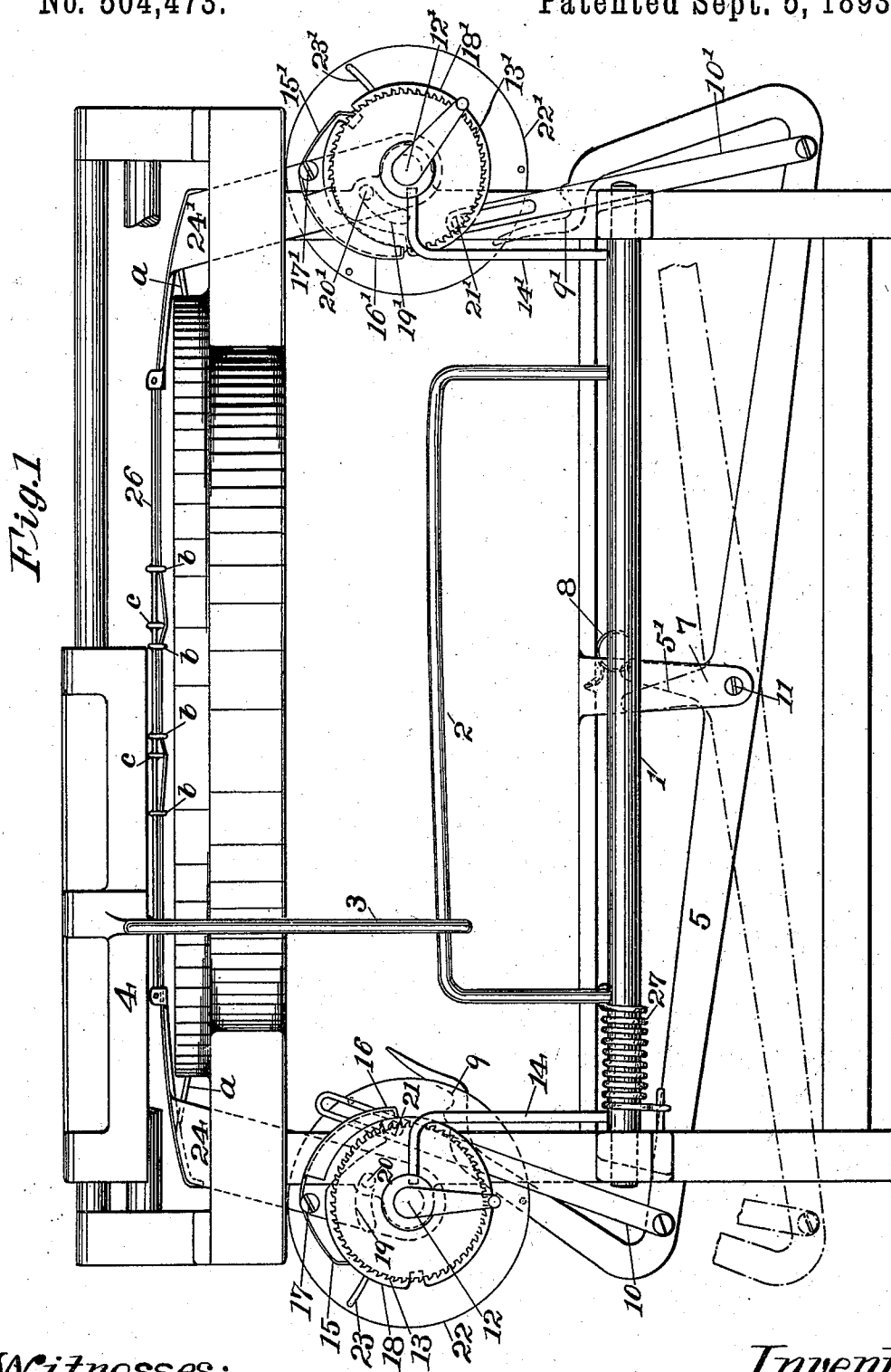
(No Model.)

4 Sheets—Sheet 1.

L. D. HITCHCOCK.
TYPE WRITING MACHINE.

No. 504,473.

Patented Sept. 5, 1893.



Witnesses:

W. H. Homise.

Ed. E. Claussen

Inventor:

Lewis D. Hitchcock

(No Model.)

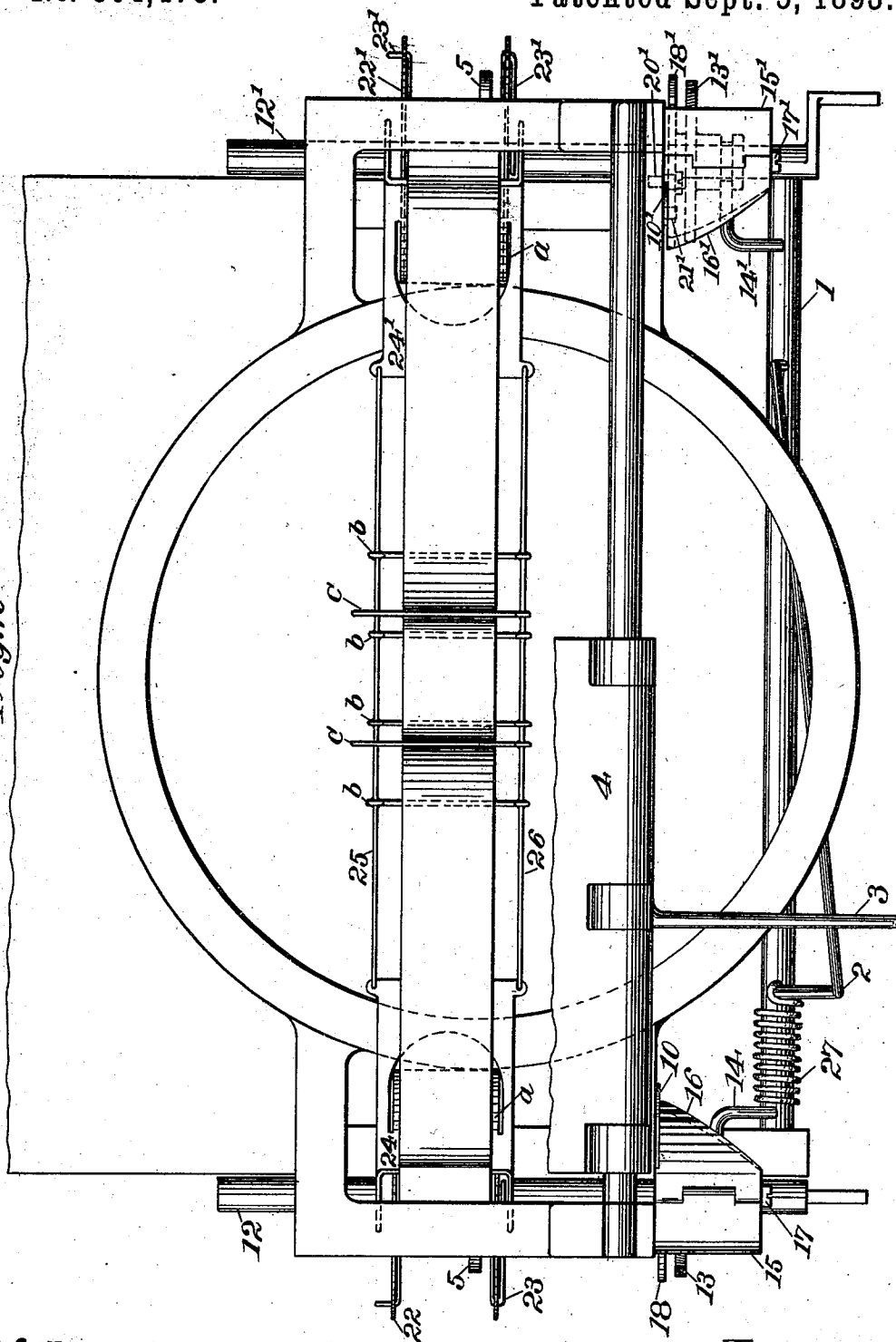
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Fig. 2



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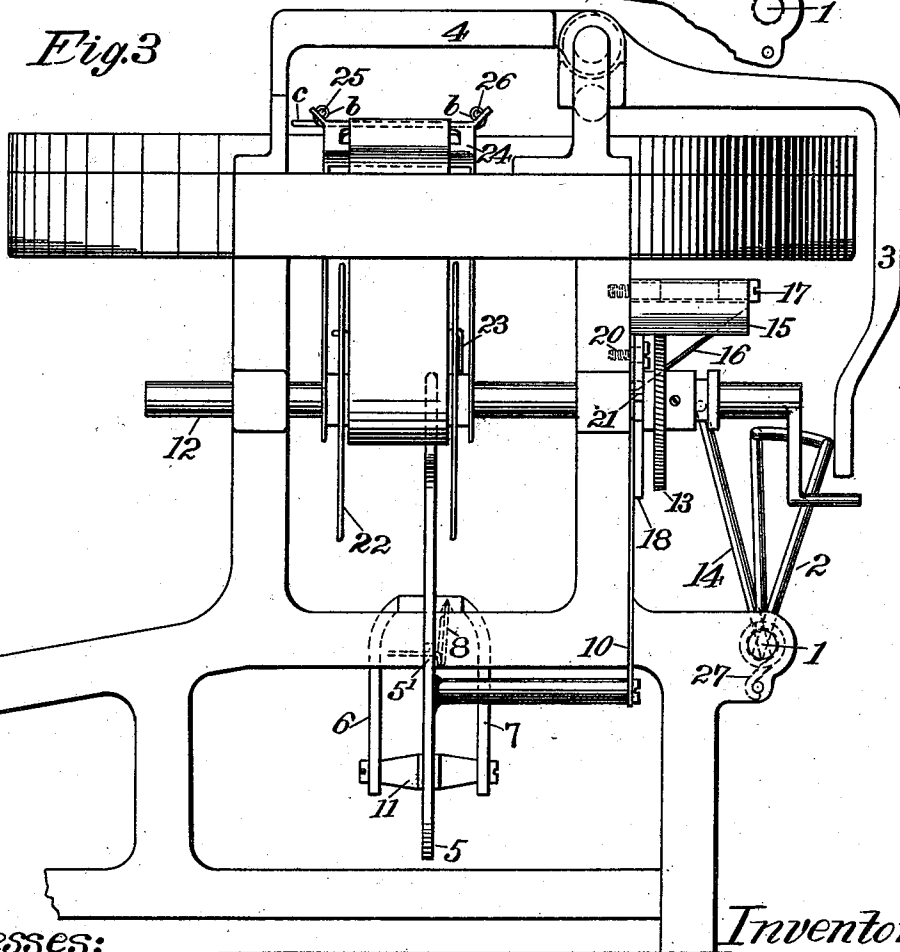
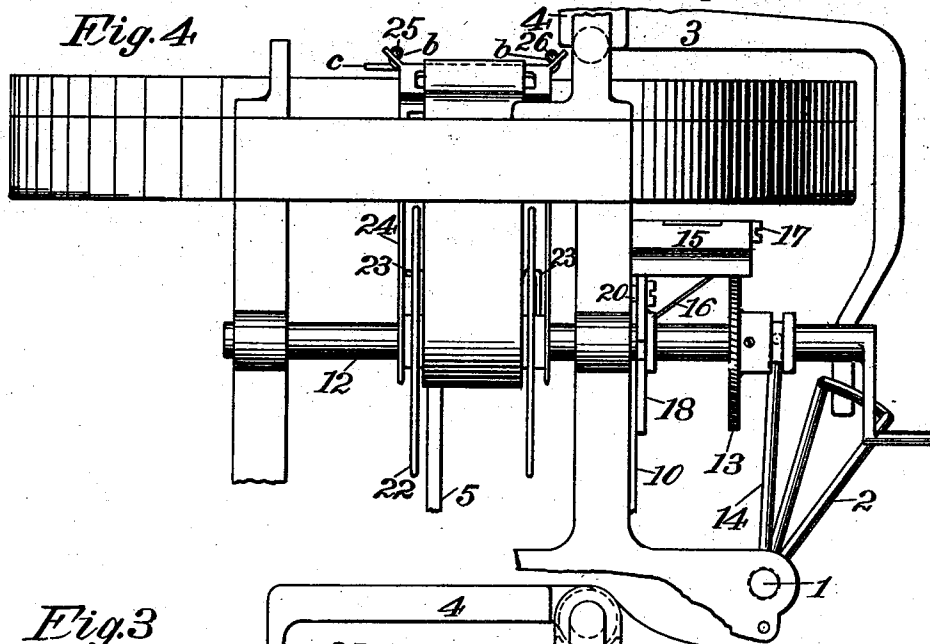
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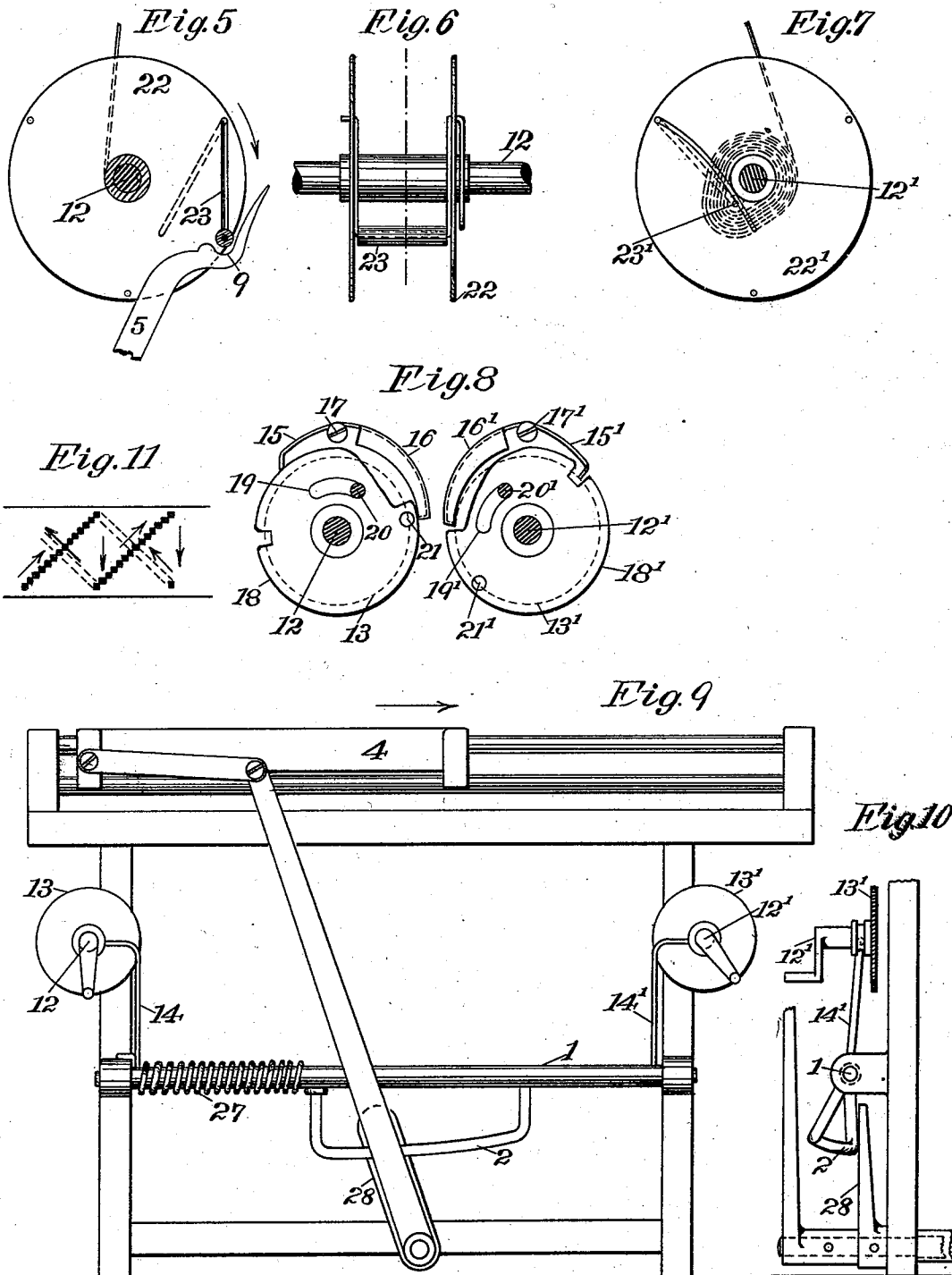
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UNITED STATES PATENT OFFICE.

LEWIS D. HITCHCOCK, OF HARTFORD, CONNECTICUT.

TYPE-WRITING MACHINE.

SPECIFICATION forming part of Letters Patent No. 504,473, dated September 5, 1893.

Application filed February 27, 1893. Serial No. 463,799. (No model.)

To all whom it may concern:

Be it known that I, LEWIS D. HITCHCOCK, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Type-Writing Machines, of which the following is a full, clear, and exact specification.

This invention relates to mechanism for feeding the ink ribbon upon typewriting and other machines, and has for its object the accomplishment of several highly desirable ends in connection therewith, among them being the following: first, to cause the ribbon to advance regularly through the machine after each impression of a character, so as to present a new place on the ribbon to the succeeding character, even when printing on narrow or column work; second, to pass the entire available length of the ribbon frequently back and forth through the machine, in order to exhaust the ink more uniformly, in contradistinction to those systems in which the ribbon is fed transversely back and forth and the ink locally exhausted; third, to provide means for automatically reversing the direction of the longitudinal feed of the ribbon when it has reached the end of its travel, or at predetermined points therein; fourth, to provide tension devices and guides which move transversely with the ribbon, and which therefore do not check or retard its movement in that direction, or allow it to curl; fifth, to provide independent means for actuating the ribbon movement, so that work will not have to be done by the fingers of the operator in striking the keys.

Figure 1 of the drawings is a rear view of the mechanism involved in my invention, showing also enough of the frame of a type-writing machine to enable its application thereto to be understood. Fig. 2 is a plan view of what is shown in Fig. 1. Fig. 3 is an end view of the mechanism, showing the parts in the position they occupy when the carriage is at the left hand end of the machine as viewed in Figs. 1 and 2. Fig. 4 is a similar view of the parts in the position they occupy when the carriage is at the opposite end of the machine. Fig. 5 is a sectional view of the left hand ribbon spool, showing the parts in their position preparatory to tripping the tilt

bar. Fig. 6 is a view of the right hand side of the spool of Fig. 5, showing the arrangement of the tripping pawl. Fig. 7 is an end view of the right hand spool, showing several turns of the ribbon wound thereon and inclosing the tripping pawl. Fig. 8 is a view showing the relative positions of the right and left hand pawls and detents, the former being in engagement with their ratchet, while the latter are held out of engagement with their ratchet by their cam. Figs. 9 and 10 are, a rear and an end view respectively of a modification of my invention, adapted to that class of machines in which the carriage is actuated from a rock shaft beneath the machine. Fig. 11 is a plan view of a portion of the ribbon, showing the path of the type impressions as made thereon.

The construction and relation of the parts will first be described, and afterward their mode of operation.

The rock shaft 1 is journaled at its ends in the frame of the machine, and is provided with the spiral wing 2, which is pressed against the arm 3 of the carriage 4 by the spring 27, the fixed end of which is attached to the frame. The wing 2 describes a left hand spiral with relation to the shaft 1, as seen in Fig. 2, so that the latter is oscillated as the carriage is moved back and forth upon its ways. The tilt bar 5 is pivoted upon extensions 6 and 7 of the frame, and is provided with the upwardly extending arm or lever 5'. One end of the spring 8 enters a countersunk hole in the frame, and the other end engages in a hole in the arm 5', the tendency of the spring being to press apart its two points of engagement, and it tends therefore to hold the tilt bar either in the full line position shown in Fig. 1, or in the dot-and-dash position shown in that figure. The ends of the tilt bar are turned upward and are provided with the engaging notches 9, 9', and with the slotted links 10, 10'. The bar and its appurtenances are balanced upon the pivot 11, and form the operative connection between the two similar mated sets of mechanism at the opposite ends of the machine. It will only be necessary to describe one of those sets of mechanism, as each element in one set has its corresponding mated counterpart in the other set. The pairing of those elements is a fea-

ture of construction only; in operation they do not coact, one of the sets being thrown out of action while the other set is in action, and vice versa. The set which is on the left hand side as seen in Fig. 1, is represented as being out of action, and that set will now be described. Corresponding elements in the two sets will be designated by similar numerals, those in the right hand set being indicated by a prime mark; as the ratchet wheels 13, 13'.

Referring to Figs. 3 and 4, the shaft 12 is journaled in the frame and is free to slide endwise to an extent substantially equal to the width of the ribbon to be used. That shaft has fixed upon it the ratchet 13, the hub of which has a circular groove adapted to engage the cranked end of the arm 14 from the rock shaft 1. The periphery of the ratchet is provided with teeth with which the detent 15, and the spiral pawl 16 are adapted to engage. The pawl and detent are free to oscillate independently upon their pivot 17, and rest by their own weight or by light spring pressure upon their ratchet when in operation, and upon the cam 18 when lifted out of operation by that cam. The working edge of the pawl 16 when in engagement with its ratchet, describes substantially a partial spiral or helix, the axis of which is coincident with that of the shaft 12. The cam 18 is free to oscillate upon its shaft 12 to the extent allowed by the slot 19, which is engaged by the pin 20 fixed in the frame; an extent sufficient to carry its pawl and detent out of engagement with the ratchet, as shown by the left hand set of mechanism of Fig. 8, the right hand set of that figure showing the opposite cam 18' in a position which allows its detent and pawl to drop into engagement with their ratchet 13'. The cam 18 is provided with the pin 21, which engages in the slot in the link 10, the other end of which is pivoted upon the tilt bar 5. The shaft 12 has also fixed upon it the ribbon spool 22, the construction of which is best seen in Figs. 5, 6, and 7. The tripping pawl 23 is pivoted in holes in the flanges of the spool, so arranged that a portion of it lies in the plane of the ribbon, which therefore passes over the pawl as it is wound upon the spool, as shown in Fig. 7. An end of the arm of the pawl bears against the hub of the spool or against any suitably located pin, and operates as a spring to carry that pawl outward as it is released by the unwinding of the ribbon. The ribbon passes from the spool 22 upward, and over the ribbon guide and tension regulator, to a similar spool 22' on the other side of the machine. The ribbon guide consists of the bifurcated pieces 24, 24', of sheet metal, which are loosely mounted on the shafts 12, 12', respectively, embracing the spools 22, 22', between their respective bifurcations; so that the ribbon guide is caused to traverse to an extent equal to the endwise movement of the shafts and their spools. The portions *a, a*, of the guides are arranged to bear against the frame of the machine to

support the guides against the pull of the ribbon in both directions. The inner ends of the guides are connected by the wires 25, and 26, and those wires are connected by the tension wires *b*, forming what is termed by me a tension ladder. The wires *c* are attached to the wire 26, and lie loosely upon the wire 25 for the easier insertion of the ribbon, which passes over the wires *b* and under the wires *c*. Those cross wires may be located at any desired points with reference to the type impression point, to prevent the ribbon from curling, or to secure a suitable tension. Similar guides or tension wires have hitherto been fixed upon part of the machine, and have tended to resist the free transverse movement of the ribbon; and the arrangement herein shown, whereby all of the guides and tension wires travel transversely with the ribbon, is of great utility.

The operation of the device is as follows: The ribbon is wound upon one of the spools, as 22, inclosing the tripping pawl 23 at that part of the ribbon at which it is desired to have it reverse on unwinding. The end of the ribbon is then passed over the guide, through the tension wires, and is secured to the other spool 22'. The mechanism is now as shown in Fig. 1; the tilt bar being in the position shown in full line, thus holding the cam 18 in the position which keeps its pawl and detent out of engagement with their ratchet, and holding the cam 18' in the position which allows its pawl and detent to engage with their ratchet 13', as shown also in Fig. 8. As the carriage moves across the machine in printing a line, its arm 3 allows the rock shaft to be oscillated by its spring 8, and that oscillation, by means of the cranked arms 14, 14' causes the shafts 12, 12', the spools, the ribbon guide, and the ribbon to move by a step by step movement in a direction transversely across the ribbon. At the same time the spool is slowly turned by the action of the spiral pawl 16' upon its ratchet 13', which operates to draw the ribbon slowly along in the direction of its length, so that the impressions made upon it are as represented by the black squares in Fig. 11. When the carriage reaches the end of its stroke and is returned by the hand of the operator in the usual way, its arm 3 operates to move the rock shaft 1 and the shafts and spools back to their former position as shown in Fig. 3. During that return stroke the ribbon does not advance longitudinally, as the spool is kept from turning by the detent 15' holding the ratchet, while the spiral pawl 16' is lifted by the teeth passing under it to take a new hold. Therefore the first stroke of the type in writing the next line, is made at a point transversely across the ribbon from its last preceding impression, as seen in Fig. 11. Thus the impressions continue in oblique lines, until the ribbon is drawn from the spool 22 sufficiently to release the tripping pawl 23, which then hangs down from its piv-

ots as shown in Fig. 5 until the rotation of the spool brings the pawl into contact with the notch 9 in the tilt bar. As the spool continues to rotate the tripping pawl pushes down that end of the tilt bar until the arm 5' passes by its vertical "dead point" position with reference to the spring 8, when the tilt bar is pressed by that spring to the dotted line position of Fig. 1. The slots in the links 10, 10' allow their respective cams 18, 18' to remain as in Fig. 8 until nearly the end of the oscillation of the tilt bar, which then operates to turn those cams, so that the detent 15' and pawl 16' are lifted out of engagement with their ratchet 13', while the opposite detent and pawl are allowed to drop into engagement with their ratchet 13. The ribbon then rewinds upon the spool 22, inclosing the tripping pawl as before. The impressions made upon the ribbon are then as shown by the dotted lines in Fig. 11. Thus the ribbon is automatically wound back and forth until it is exhausted of ink or until it is worn out.

When it is desired to use both a copying and a record ribbon upon the machine at the same time they may be joined together and one of the tripping pawls set so as to reverse when the joint is reached. The pawl is set by removing it from the spool and winding or unwinding the necessary turns of the ribbon. A series of holes is provided in the flanges of the spools to facilitate the more exact setting of the pawl, and the consequent reversal of the feed.

A valuable feature of this invention is the arrangement of an independent means for actuating the ribbon movement, so as to relieve the keys and the fingers of the operator from that work, and thereby secure a lighter "touch." That actuating force, in the present instance the spring 27, may also assist the carriage actuating spring if the spiral wing 2 be made upon an angle sufficient to push forward the carriage arm 3, in which case the carriage spring may be made lighter, or have less tension.

This invention may be adapted to that class of machines in which the carriage is actuated from a rock shaft located beneath the machine, as shown in Figs. 9 and 10, in which the arm 28 bears against the wing 2 of the rock shaft 1. That wing in this case is a right hand spiral, as it engages below its shaft instead of above as in Figs. 1 and 2.

In the arrangement herein shown, the ribbon spools and ratchet are fixed upon shafts which rotate and also slide endwise on their bearings. I do not limit myself to this particular construction, as it is obvious that each spool may be attached directly to its ratchet, revolving together upon their respective shafts and those shafts slide endwise in their bearing. Or the shafts may be fixed, and the spools, attached to their respective ratchets may both revolve and slide endwise upon

those shafts. Or the ratchets may be fixed on the sides of the frame adjacent to the spools, and their respective pawls and detents be attached to those spools, and drawn back and forth in engagement with their ratchets, thus operating to turn the pawls and their attached spools.

The spiral pawls as herein shown, are arranged to pull the ratchets around; but the spiral working edge of the pawl may be equally well adapted to push its ratchet in the desired direction. The term "spiral" as herein applied to the wing 2, and to the pawls 16, 16' is used in its general and comprehensive sense, it being understood that the working edges of those parts are to be shaped according to the motion desired. The engaging edge of the detent may also be made spiral or angular if it is desired to advance the ribbon on the return stroke as well as on the forward stroke. A weight may also be adapted to perform the function of the spring 8; and many other modifications may be made of this invention by the exercise of merely mechanical skill, without departing from the spirit and substance thereof.

I claim as my invention—

1. A ribbon spool adapted to be moved endwise upon its bearings, a spring actuated rock shaft, having an arm engaging with the spool, and having a spiral wing adapted to engage with a moving carriage, arranged and operating to slide that ribbon spool endwise as the carriage is moved upon its ways, substantially as described.

2. A ratchet wheel, and a pawl adapted to be moved into and out of engagement with that ratchet, the engaging portion of the pawl consisting of a spiral fin, the axis of which is coincident with that of the wheel when the pawl is in its engaging position; substantially as described.

3. A ratchet wheel arranged to slide endwise on its bearings, a pawl, adapted to be moved into and out of engagement with the ratchet, and having a spiral fin arranged and operating to turn the ratchet wheel upon its bearings as it is moved endwise thereon; substantially as described.

4. A ratchet wheel arranged to slide endwise upon its bearings, a pawl located adjacent thereto, having a spiral working edge adapted to turn the ratchet wheel as it is moved endwise in one direction, and a detent adapted to engage the ratchet, and operating to keep it from turning back when moved endwise in the other direction, substantially as described.

5. A ratchet wheel, a spring actuated rock shaft adapted to engage the ratchet and to move it endwise upon its bearings, a pawl pivoted adjacent to the ratchet wheel and having a spiral working edge adapted to engage therewith, and a detent also adapted to engage with the ratchet wheel, all arranged and

operating to revolve the ratchet wheel as it is moved back and forth by the rock shaft, substantially as described.

- 5 6. A ratchet wheel, with a pawl and detent adapted to engage therewith, and a cam journaled concentrically with the ratchet wheel and operating to carry that pawl and detent into or out of engagement with their ratchet wheel; substantially as described.
- 10 7. A pair of oppositely disposed ratchet wheels, each having a pawl, a detent, and a cam adjacent thereto, a pair of links and a tilting bar connecting those cams, and operating to lift the pawls and detent of one of
- 15 those ratchets out of engagement, while allowing those of the other ratchet to engage therewith; substantially as described.
8. A ribbon spool, and a tripping pawl pivoted to the flanges of the spool, and having a
- 20 portion lying within the plane of the ribbon, adapted to be wound in by the ribbon and to be released as the ribbon is unwound; substantially as described.
9. A ribbon spool, a tripping pawl pivoted
- 25 to the flanges of that spool and lying partly within the plane of the ribbon, with a spring arm arranged and operating to carry that pawl outward when released by the ribbon; substantially as described.
- 30 10. A tilting bar adapted to oscillate upon a pivot, a spring arranged to press the bar either way from a dead center, and a pair of tripping pawls pivoted upon oppositely disposed ribbon spools, arranged and operating

to oscillate the tilting bar past the dead point 35 of its spring, alternately in opposite directions; substantially as described.

11. A ratchet wheel, having a pawl, a detent, and a cam adjacent thereto, a tilting bar and a link connected with that cam, and a tripping pawl, carried on a ribbon spool and adapted to engage with and operate that tilting bar; substantially as described.

12. A tilting bar, a spring adapted to press that bar in either direction from a dead center, 45 a pair of links connecting the opposite ends of the bar with two oppositely disposed sets of mechanism, each set consisting of a ratchet wheel, a spiral pawl, a detent, a cam, a ribbon spool, and a tripping pawl, the latter being pivoted on the spool and partly located within the plane of the ribbon and of the tilting bar, all arranged and operating to reverse the direction of the longitudinal movement of the ribbon when one of the tripping 55 pawls is released by the unwinding of the ribbon and is carried against the tilting bar; all substantially as described.

13. A pair of oppositely disposed ribbon spools, adapted to be moved endwise upon 60 their bearings, and a ribbon guide and tension ladder carried by those spools, arranged and operating to move laterally with the ribbon; substantially as described.

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Witnesses:

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ED. E. CLAUSSEN.