(No Model.)

2 Sheets—Sheet 1

J. A. WATSON.

TYPE WRITING MACHINE.

No. 477,236. Patented June 21, 1892.

Fig. 1.

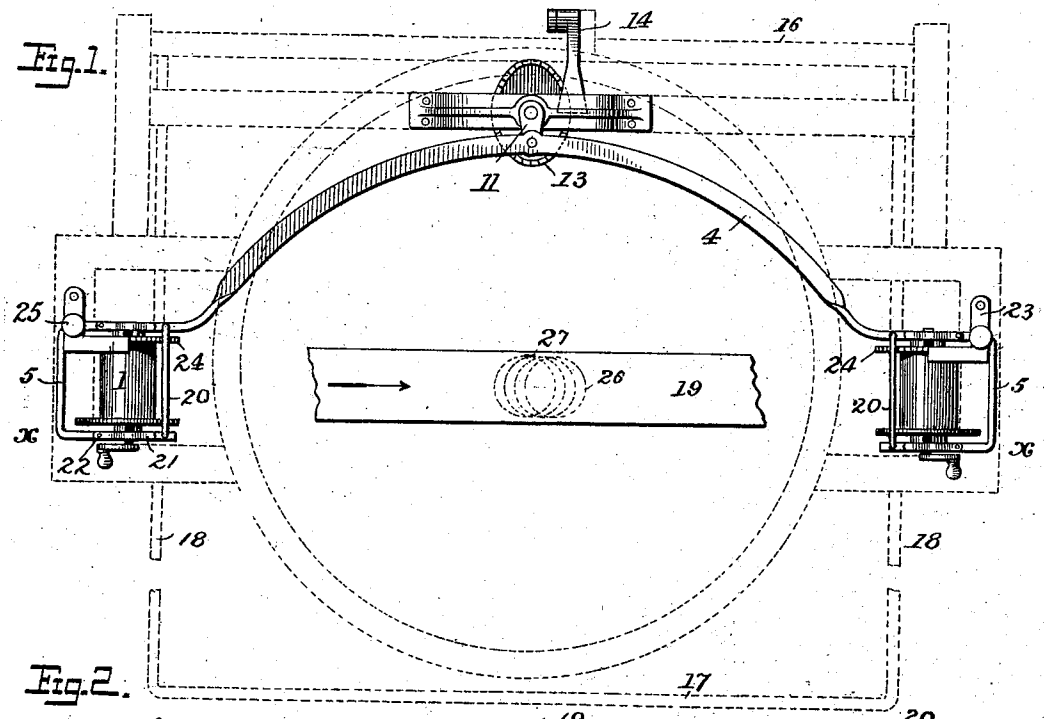
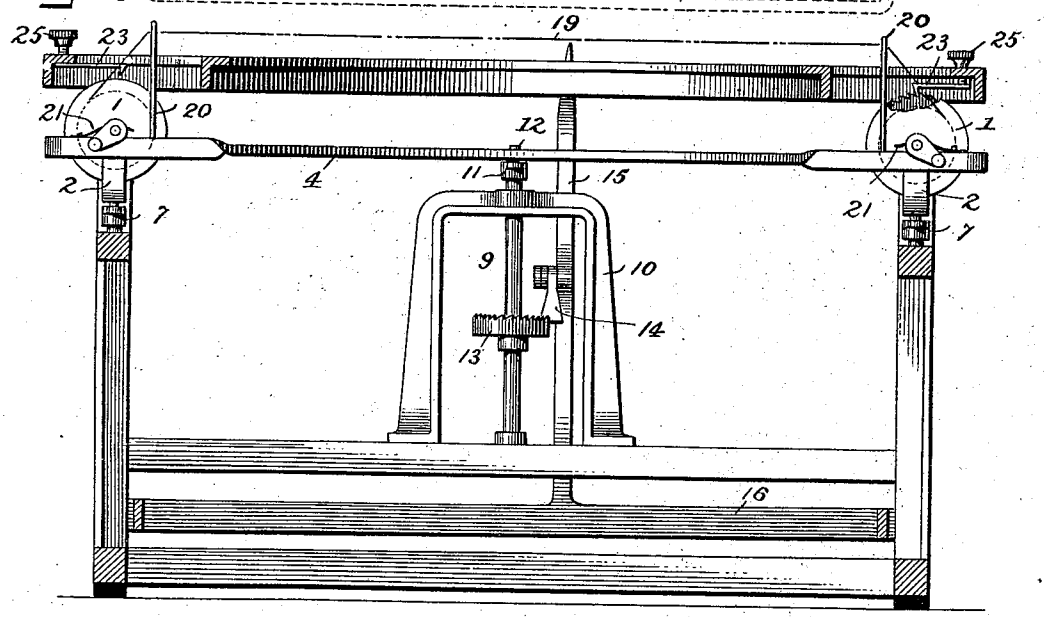


Fig. 2.



Witnesses
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D. Wallace Dunean

Inventor
J. A. Watson

(No Model.)

2 Sheets—Sheet 2.

J. A. WATSON.

TYPE WRITING MACHINE.

No. 477,236. Patented June 21, 1892.

Fig. 3.

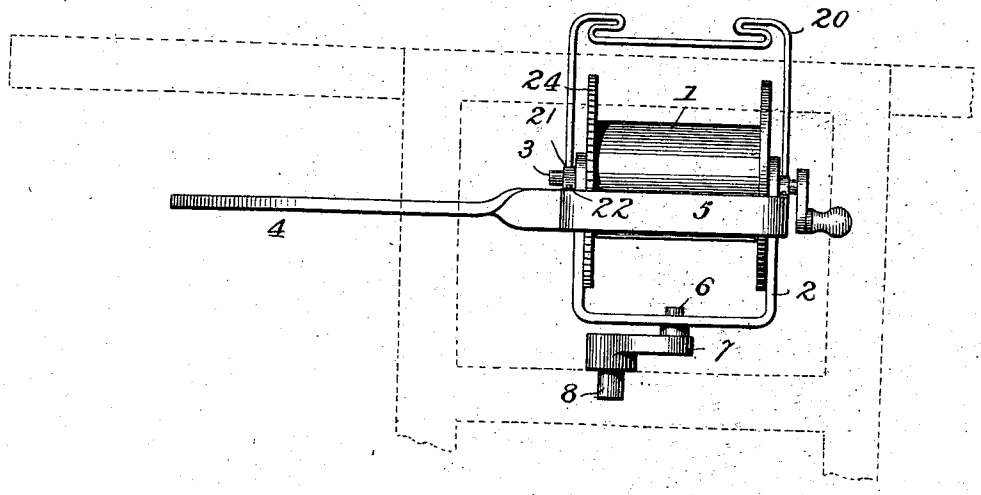


Fig. 4.

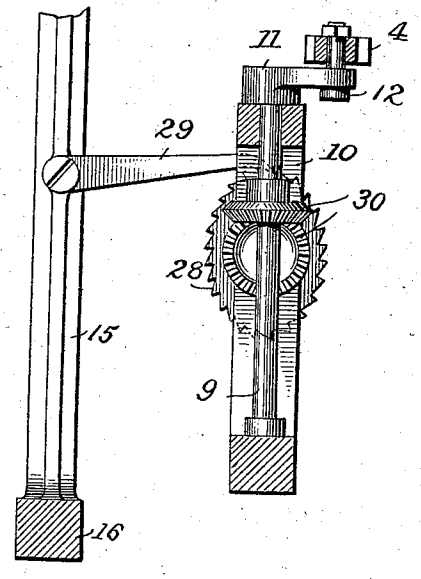
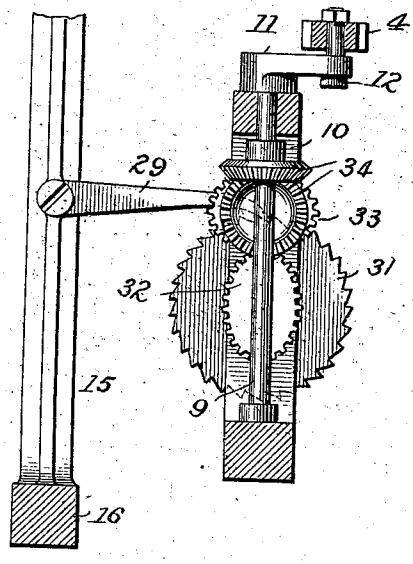


Fig. 5.



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UNITED STATES PATENT OFFICE.

JAMES A. WATSON, OF WASHINGTON, DISTRICT OF COLUMBIA.

TYPE-WRITING MACHINE.

SPECIFICATION forming part of Letters Patent No. 477,236, dated June 21, 1892.

Application filed April 8, 1892. Serial No. 428,384. (No model.)

To all whom it may concern:

Be it known that I, JAMES A. WATSON, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Type-Writing Machines, of which the following is a specification.

My invention relates to ribbon-feeding devices for type-writers; and it consists in mechanism for feeding the ribbon automatically both lengthwise and widthwise, so as to use its entire surface as it passes once through the machine.

In the accompanying drawings, in which like reference-signs refer to similar parts throughout the several views, Figure 1 is a plan view, the parts illustrating my invention being shown in full lines and a portion of the frame of a type-writer in dotted lines. Fig. 2 is a section on the line X X of Fig. 1, showing my improvements in elevation. Fig. 3 is an end elevation of the spool and spool-support shown on the left in Fig. 1, and Figs. 4 and 5 are views of different forms of driving mechanism.

The object of my invention is to produce ribbon-feeding devices which will feed the ribbon lengthwise, and also cause it to travel widthwise over the printing-point, so as to present practically its entire surface to the printing-point while it passes from one spool to the other and to accomplish these movements with the simplest possible mechanism. I attain these results by mounting the spools in supports or frames which rotate bodily, while at the same time maintaining the axes of the spools constantly parallel to each other, and by providing connections between the spool-supports maintain them in a constant relation to each other, so that while they revolve there will be no strain upon the ribbon, which is wound partially upon each of the spools. Having imparted a similar rotary motion to both of the spools in a plane substantially parallel with the plane of the ribbon and in circles having a radius equal to about one-half of the width of the ribbon, it will be evident that the intermediate ribbon, which stretches across the printing-point, will also have a rotary motion, and that the type will strike successively upon the circumference of a circle which is embraced within the width of the ribbon. I also provide means for shifting the ribbon lengthwise at the completion of each revolution of the spool-supports a sufficient distance, so that the type will not strike exactly in the same places during the succeeding revolution. The movements above outlined would cause the printing-point to travel relatively to the ribbon in a series of overlapping circles, which circles would cross each other near the margin of the ribbon, and thus the ribbon would be used more near the margin than in the middle. When it is desirable to overcome this objection, I introduce additional mechanism to cause the spools and ribbon to rotate faster when the margins are passing the printing-point than when the middle portion is passing, and I so graduate and vary the rotary movement of the ribbon that its entire surface will be used practically to the same extent. I also provide means for reversing the movement of the spools, so that the ribbon will wind from either one onto the other.

Referring to Figs. 1 to 3, inclusive, of the drawings, 1 indicates the spools, which are mounted in spool-supports 2, consisting of U-shaped pieces having openings in their upper ends to form bearings for the spool-shafts 3. To keep the spool-supports in a constant relation to each other with the spool-shafts parallel, I preferably connect both supports to a frame, consisting of a bar 4, extending around the rear of the machine and bent at its ends into U-shaped portions 5, the arms of which portions embrace the spool-supports. The spool-supports 2 are perforated to receive the crank-pins 6 of idle-cranks 7, which revolve about shafts 8, set in the frame. Upon a driving-shaft 9, arranged vertically in a frame 10 at the rear of the machine, is a crank 11, having a crank-pin 12, which passes through a perforation in the middle portion of the bar 4 of the connecting-frame. The cranks 7 and 11 have exactly the same throw, and as they are situated out of line when one of the cranks is turned the others follow, always remaining parallel to each other, and thus imparting a simultaneous rotation to the frame, the spools, and the ribbon.

If the driving-shaft 9 were given uniform rotary movement, the ribbon would be used more near the margin than at the middle portion.

To obviate this difficulty, I use mechanism which will give the driving-shaft a slow movement when the middle of the ribbon is at the printing-point and which will gradually increase the rapidity of the movement as the margin of the ribbon approaches the printing-point, and then gradually decrease the rapidity of the movement as the margin recedes from the printing-point. In this way all portions of the ribbon may be used to the same extent. The simplest form of mechanism for this purpose consists of an elliptical ratchet-wheel 13, fixed upon the shaft 9 and operated by a broad pawl 14, attached to a vibrating arm 15. The arm 15 extends upward from a rock-shaft 16, which is rocked by the universal bar 17, underlying the key-levers, which is connected to the rock-shaft by arms 18. The universal bar is commonly used in type-writers for operating the carriage-feed mechanism, and it need not therefore be more fully described herein. The arm 15 may be extended upward to operate the escapement of the carriage-feed, if desired. It will be evident that when the pawl is operating upon the teeth of the ratchet nearest to the driving-shaft the shaft will rotate fastest, and that the rapidity of rotation will gradually decrease until the pawl reaches the teeth which are farthest away from the shaft. The ribbon 19 passes over guides 20, which, as shown, are formed of wires suitably bent and attached to the connecting-frame of the spool-supports. Springs 21, held in place by adjustable screws 22, retain the ribbon-shafts in their bearings and produce any desired tension in the ribbon.

In order to feed the ribbon lengthwise once during each rotation, I attach to the frame of the machine detents 23 and to each of the spools-shafts a ratchet-wheel 24. As shown, the detents 23 consist of right-angled plates of spring metal rigidly connected at one end to the main frame and normally out of contact with the ratchet-wheels, as shown on the left of Fig. 2. The detents may be pressed down into the paths of the ratchet-wheels by means of thumb-screws 25, the one on the right of Fig. 2 being shown so pressed down. A section of the ribbon 19 is shown in Fig. 1, and on it dotted lines 26 indicate some of the successive circles of ribbon which have been presented to the printing-point 27. As shown, the ribbon is traveling in the direction of the arrow.

The operation of the devices above described is as follows: Each time a key-lever is operated the universal bar is depressed, the rock-shaft vibrated, and the ratchet-wheel and driving-shaft 9 moved slightly by means of the pawl 14. As the driving-crank 11 is rotated the idle-cranks 7 are carried around simultaneously, all three cranks continuing parallel to each other, so that the spool-supports receive a simultaneous rotation. The pawl 23 on the right being held down by a set-screw and the one on the left being up, as shown when the spool reaches the pawl, as shown in Figs. 1 and 2, the ratchet-wheel 24 (which in this instance constitutes one end of the spool) will be engaged by the pawl, and as the spool-supports rotate the spool on the right will be turned, winding up a portion of the ribbon in the direction of the arrow. The spools and ribbon will then be carried through a complete circle before the ribbon is again fed forward longitudinally, the speed of the rotation of the spool-supports varying, as hereinbefore described.

In Figs. 4 and 5 I have shown two other forms of mechanism by which the variable rotation of the spool-supports may be attained. In Fig. 4 an elliptical ratchet-wheel 28 is operated by a pawl 29, and the driving-shaft 9 is driven from the ratchet-wheel by means of a pair of beveled gears 30, the vertical beveled wheel and the ratchet-wheel being fixed upon a horizontal shaft passing through the frame 10. In Fig. 5 the pawl 29 rotates a circular ratchet-wheel 31, and upon the same shaft with the ratchet-wheel is an elliptical gear 32, which meshes with a second elliptical gear 33. From the second gear movement is communicated to the driving-shaft by a pair of beveled gears 34. The elliptical ratchet-wheels shown and the elliptical gears are substantially equivalent, and I shall hereinafter designate both forms and their equivalents by the generic term "elliptical gearing."

While I have illustrated my invention in the best mechanical form which I have been able up to the present time to devise, it will be evident that the principle of the invention may be carried out in various other ways; therefore,

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

1. In a type-writer, the combination, with the ribbon and spools, of spool-supports, connections between said supports for maintaining the spools in a constant relation to each other, and means for imparting rotation to said supports in a plane substantially parallel with the plane of the ribbon.

2. In a type-writer, the combination, with the ribbon and spools, of spool-supports, connections between said supports for maintaining the spools in a constant relation to each other, and means for imparting a variable rotary movement to said supports in a plane substantially parallel with the plane of the ribbon, whereby the margin of the ribbon is made to travel over the printing-point more rapidly than the middle portion.

3. In a type-writer, the combination, with the ribbon and spools, of spool-supports, connections between said supports for maintaining the spools in a constant relation to each other, means for rotating said supports, and elliptical gearing, substantially as described, for varying the speed of the supports during each rotation.

4. In a type-writer, the combination, with

the ribbon and ribbon-spools, of spool-supports, connections between said supports for maintaining the spools in a constant relation to each other, cranks upon which said supports are carried, and means for rotating the cranks simultaneously, substantially as described.

5. In a type-writer, the combination of the spool-supports, the curved frame connecting the supports, and the rotatable cranks for carrying said frame and supports, substantially as described.

6. In a type-writer, the combination, with the ribbon and spools, of spool-supports, connections between said spool-supports for maintaining the spools in a constant relation to each other, means for imparting rotation to said supports in a plane substantially parallel with the plane of the ribbon, and means for turning the ribbon-spools to feed the ribbon lengthwise, substantially as described.

7. In a type-writer, the combination, with the ribbon and spools, of spool-supports, connections between said supports for maintaining the spools in a constant relation, means for imparting rotation to said supports in a plane substantially parallel with the plane of the ribbon, ratchet-wheels connected with the spools, and detents attached to fixed supports and movable into and out of engagement with the ratchet-wheels, substantially as described.

8. In a type-writer, the combination, with the ribbon and ribbon-spools, and ratchet-wheels connected with the spools, of a curved frame connecting the spool-supports, three cranks arranged to carry said frame and supports, means for rotating the cranks, and detents connected to the frame of the type-writer and movable into and out of engagement with the ratchet-wheels, substantially as described.

9. In a type-writer, the combination, with the ribbon and spools, of spool-supports, a curved frame connecting said supports, three cranks mounted in the main frame and arranged to carry said curved frame and supports, and elliptical gearing for imparting variable rotary movement to the cranks, substantially as described.

10. In a type-writer ribbon-feeding mechanism, the combination, with a rock-shaft and an arm and pawl carried thereby, of elliptical gearing operated by the pawl for imparting a suitable movement to the ribbon, substantially as described.

11. In a type-writer ribbon-feeding mechanism, the combination, with a rock-shaft and a broad pawl carried thereby, of a revoluble shaft and an elliptical ratchet-wheel fixed upon the shaft, said pawl being arranged to engage the teeth of the ratchet-wheel, whereby a variable movement is given to the shaft, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

J. A. WATSON.

Witnesses:
W. CLARENCE DUVALL,
WM. E. NEFF.