(No Model.) 3 Sheets—Sheet 1.

W. S. BURROUGHS.

PRINTING RECORDER.

No. 420,617. Patented Feb. 4, 1890.

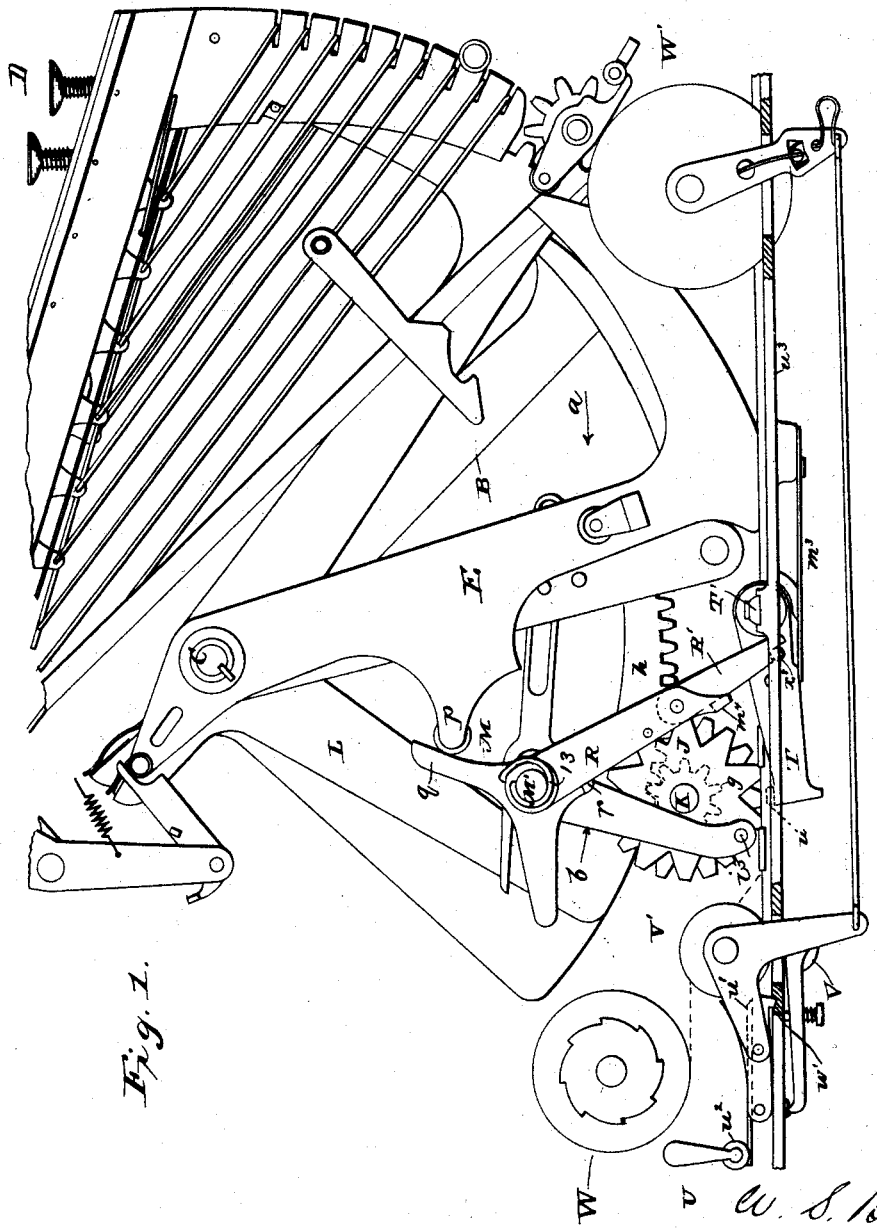

Fig. 1.

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(No Model.) 3 Sheets—Sheet 2.

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PRINTING RECORDER.

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Fig. 2.

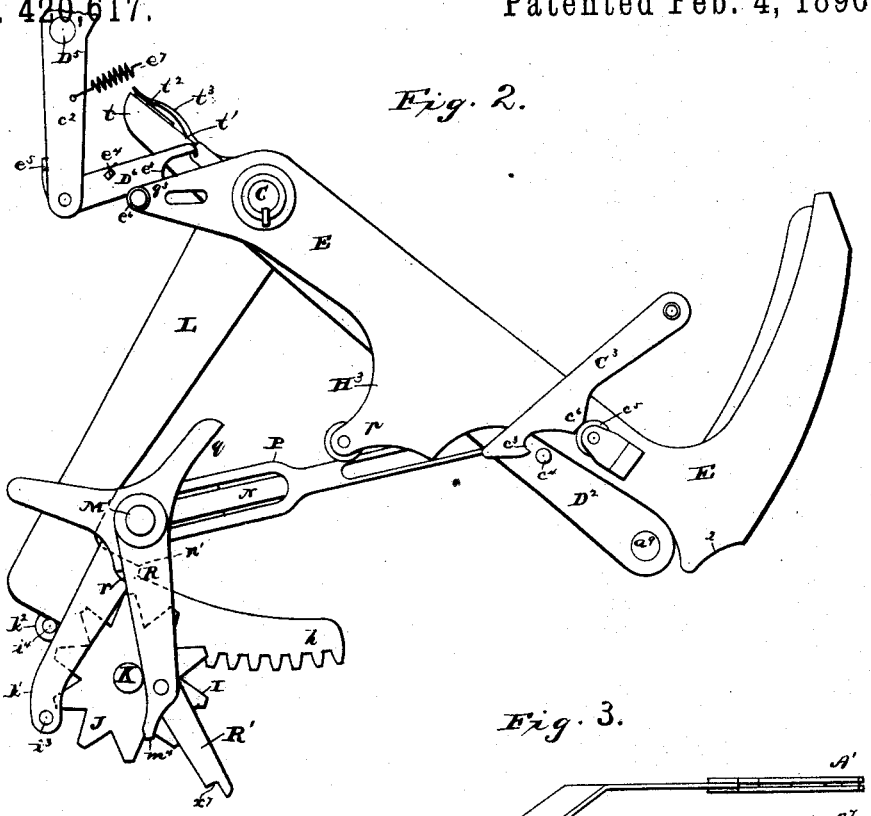
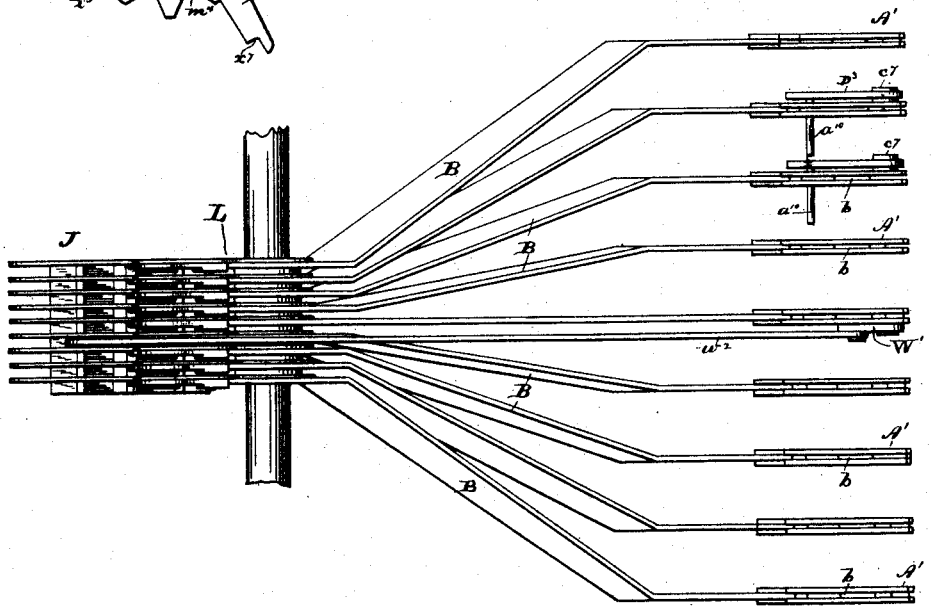


Fig. 3.



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(No Model.) 3 Sheets—Sheet 3.

W. S. BURROUGHS.

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Fig. 4.

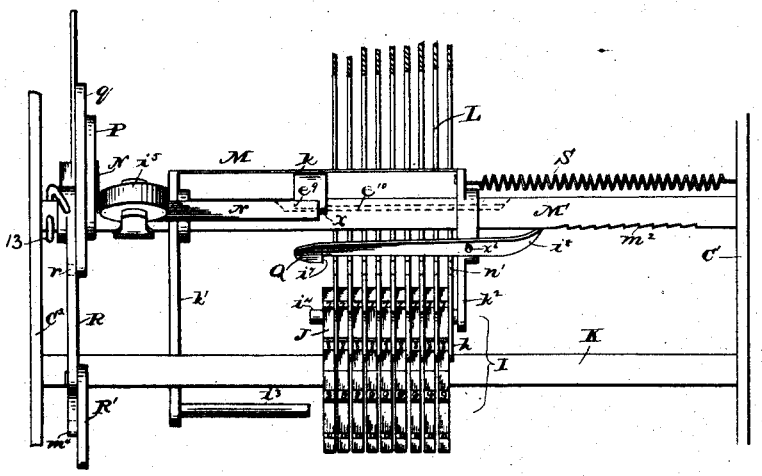
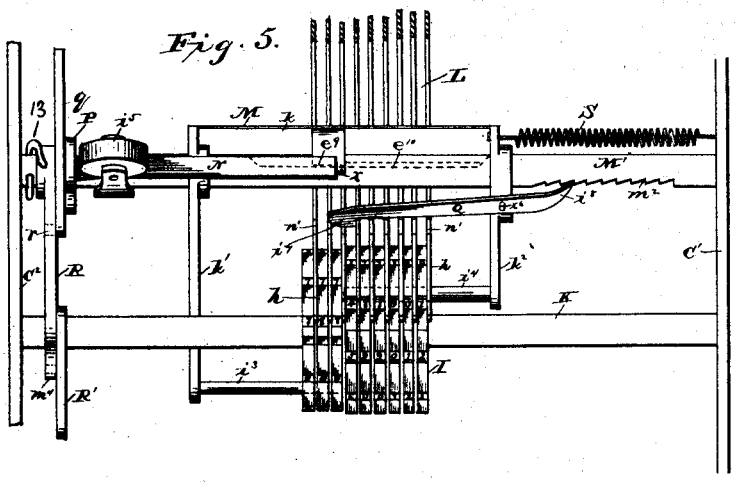


Fig. 5.



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UNITED STATES PATENT OFFICE.

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

PRINTING-RECORDER.

SPECIFICATION forming part of Letters Patent No. 420,617, dated February 4, 1890.

Application filed July 3, 1888. Serial No. 278,907. (No model.)

To all whom it may concern:

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

My invention relates to that class of printing-recorders in which numbers are printed from a series of type-wheels arranged side by side; and my invention consists of devices, fully set forth hereinafter, for permitting the type-wheels to be arranged in juxtaposition while operated from separated keys for printing only from those wheels which contain the figures in the sum to be indicated, and for automatically effecting the adjustment of the wheels, locking them in position for operating the type, and severing the paper.

In the accompanying drawings, Figure 1 is a side elevation of part of a mechanical calculator, showing my improved recorder combined therewith; Fig. 2, a similar view showing parts of the machine in a different position. Fig. 3 is a plan view of the recorder and actuating-levers. Figs. 4 and 5 are separate elevations looking in the direction of the arrow *a*, Fig. 1, and showing the recorder and devices for automatically setting and locking the levers.

The recorder consists of a series of notched wheels J, turning upon a shaft K, and each wheel having a series of figures from 0 to 9, Figs. 4 and 5, upon the periphery constituting printing-type. These wheels may be set in position or actuated by any suitable actuating devices not necessarily connected with this feature of my invention; but, as shown, each wheel is provided with a pinion *g* upon the side, gearing with the rack *h* of the lever L, hung to a shaft C and connected with a lever B, each lever B being controlled in its movements by a series of keys D in a manner and through devices which need not be here described, as they constitute no part of this invention and are fully set forth in my Letters Patent dated August 21, 1888, No. 388,118.

It is desirable that the wheels of a printing-recorder shall be arranged side by side in close proximity in order that the figures printed may not be separated by extended intervening spaces; but when the wheels have heretofore been used in connection with keys arranged upon a key-board and with intermediate actuating devices it has been necessary to separate the wheels in consequence of the necessary separation of the numerous keys to enable them to be properly manipulated. In order to obviate this defect, I arrange the wheels of the recorder in the desired proximity to each other and the keys of the key-board in their necessarily separated positions and employ an intermediate series of actuating devices diverging from the recorder to the keys. Thus the rack-levers L, Fig. 3, are arranged in proximity to operate each directly upon one of the wheels, while the connected levers B are separated at their ends, so that the end of each lever will be directly under the series of keys D by which it is operated or controlled. By this means I am enabled to spread the keys upon the key-board to any desired extent without separating the printing-wheels.

It will be evident that if all the printing-wheels J are at zero and a number of the wheels are moved to set up a number to be printed, and the types or figures on said wheels brought in line with the cipher-types upon the other wheels, the matter printed will consist of one or more ciphers preceding a number of figures in line. Thus if there are nine wheels and five of them are moved to bring certain figures into position to print the number 92816, the line printed will present this appearance, 000092816. As the presence of the ciphers before the other figures is not only useless but confusing, I prevent the printing of any but the figures required to represent the sum by such an adjustment of the wheels that no printing is effected from those representing a higher value than the highest figure in the sum to be printed.

To lock both the printing and non-printing wheels in position, I use a frame M, Figs. 1, 4, and 5, sliding on a shaft M′, parallel to the shaft K, said frame consisting of two side pieces or arms k' k^2 and a cross-piece *k*, the latter carrying a feather e^9, extending into a slot e^{10} in the shaft M′, so that the frame will slide on and rock with said shaft. The arm

k' carries a rod i^3 and the arm k^2 a rod i^4, the rods projecting toward each other and their ends being nearly in the same vertical plane, the rod i^4 being above the horizontal plane of the shaft K and the rod i^3 below said plane, and so arranged that when the wheels J are turned to the position shown in Fig. 2 and the frame M is rocked in the direction of its arrow b to the position shown in Fig. 1 the rod i^4, Fig. 2, will contact with the shoulders of the opposite type-wheels and hold them in position to print, while the arm i^3 will contact with the shoulders of the non-printing wheels and turn them to such an extent as to carry their type out of printing position and hold the wheels with the spaces or notches in line with the printing-type of the other wheels.

It will be seen that by sliding the frame M to such a position as may be required, any desired number of wheels may be cut out of printing position.

It is desirable that the frame M shall move automatically, and after any number has been set up by the wheels be set to such a position that the non-printing wheels will be cut out of action when the frame is stopped. Different means may be employed for effecting this result, depending upon the character of machine in which the recorder is employed, one means being illustrated in the drawings. Thus a spring S, Figs. 4 and 5, tends to draw the frame M toward the right, and a flexible band or strap N passes around a guide-pulley i^5 and is connected with any vibrating part of the machine—as, for instance, with a plate P, connected with one of the side levers E, so that the frame will be drawn fully to the left after each number has been printed.

To the frame M at x^6 is pivoted a pawl Q, having a long arm with a beveled end i^7 and a short arm bent and formed into a pawl i^8, adapted to engage with a rack m^2 on the shaft M′, the teeth of which are spaced to correspond to the distance between the rack-levers L. The levers L have each a projection n', Figs. 2, 4, and 5, at the upper edge of the rack portion, so situated that when the parts are in the position shown in Fig. 5 the pawl Q will rest upon the said projections n' and slide thereon as the frame is carried to the right. When one or more of the rack-levers (beginning at the right) are moved back by the action of the keys, the projections n' of such rack-levers pass from below the pawl and allow the long end of the latter to drop and the short end of the pawl to engage with one of the teeth of the rack m^2 and prevent further movement of the frame.

The pawl Q does not immediately drop upon the movement of lever L, but will drop while passing the opening made by the movement of said lever. The rack-teeth m^2 on the shaft M′ are spaced to correspond with the rack-levers L, so that when the projection i^7 of the pawl Q is allowed to drop in the opening made by the movement of one of the rack-levers the end i^8 of the pawl Q will engage with rack-tooth m^2 corresponding in position to the rack-lever moved. If it is desired to print the amount 10000, the fifth-rack lever, counting from the right, will be moved. It will now be seen that as the pawl Q is carried to the right by the movement of the frame M the projection i^7 will will drop on reaching the space made by the movement of the sector-lever L, and the end i^8 of the pawl Q will contact with the corresponding rack-tooth m^2. By this movement of the frame M the rod i^4 is brought to a position to contact with the first five recorder-wheels J and the rod i^3 with the remainder. After a number has been printed the draft upon the strap N carries the frame M to its first position. The shaft M′ and its frame are rocked as the parts reach their lowest position by means of any suitable connection—for instance, by the contact of a projection p on one of the levers E upon the shaft C with an arm q, projecting from the shaft M′. An arm R, carried by the shaft M′ and connected thereto by a stiff spring 13, which yields slightly when necessary, carries a pawl R′, having a shoulder x^7, which, when the arm R swings forward, engages with a pin x^8 on one of two arms T, secured to a rock-shaft T′ and constituting a carrier for a platen u. A spring m^3 lifts the platen, and the latter is depressed as the pawl R′ is brought in line with the arm R until a stop m^4 on the arm strikes the pawl, when the latter will be carried from the pin x^8, and the spring m^3 will force the platen with a quick sharp blow against the type or against the paper. An inking-ribbon is carried by spools W W′ and passes under guide-plates and between the recorder and the platen.

The strip of paper to be printed passes between the feed-rolls V V′, and to permit the ready detachment of the printed portion of the paper I arrange a knife w', Fig. 1, upon a rock-shaft w^2, having a handle U outside the frame of the machine, and there is a recess in the base-plate w^3 of the machine, forming a transverse shoulder w', against which the paper is bent by the descent of the knife, so that a smart pull on the projecting end of the paper will separate the same along the line of the knife-edge.

The movement of the feed-rolls may be imparted by any of the well-known feed-operating devices, which need not be here explained.

When it is not desired to lock the printing-wheels, but one rod may be used, and the rod or rods may be carried by any suitable form of carrier.

I do not here claim, broadly, a movable bar combined with a series of type-wheels to turn part of the series, so that only those to print shall be in printing position, as this constitutes the subject of a separate application for Letters Patent, Serial No. 279,800, filed July 13, 1888.

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

1. The combination, with the wheels of a printing-register, of a rod supported by a carrier to travel past and to and from said wheels to move the non-printing wheels out of printing position, substantially as set forth.

2. The combination, with the wheels of a printing-register, of a movable carrier provided with two rods with their inner ends on about the same vertical plane arranged to contact with the printing-wheels, one to hold the wheels in printing position and the other to turn them out of printing position, substantially as described.

3. The combination, with the printing-wheels, of rack-levers having projections n', sliding and rocking frame M, carrying rods i^3 i^4, pawl carried by the frame in position to contact at one end with the said projections, and a rack arranged to be engaged by the other end of the pawl, substantially as described.

4. The combination, with the printing-wheels, of a carrier carrying the platen, a spring arranged to move the carrier toward the printing-wheels, and a movable arm or pawl arranged to contact with and force out the said carrier and to then move out of engagement therewith, substantially as set forth.

5. The combination, with the printing-wheels and feed-rollers, of a plate having a transverse shoulder w' and a knife u', movable to and from said shoulder, substantially as set forth.

6. The combination of independently-movable record-wheels arranged side by side in close proximity, a series of keys to each wheel, the keys arranged in separated positions to facilitate manipulation, and independent connections between each wheel and one series of keys, said connections diverging from the wheels to the keys, substantially as set forth.

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

WILLIAM S. BURROUGHS.

Witnesses:
EMIL WENGER,
JAMES WEST.