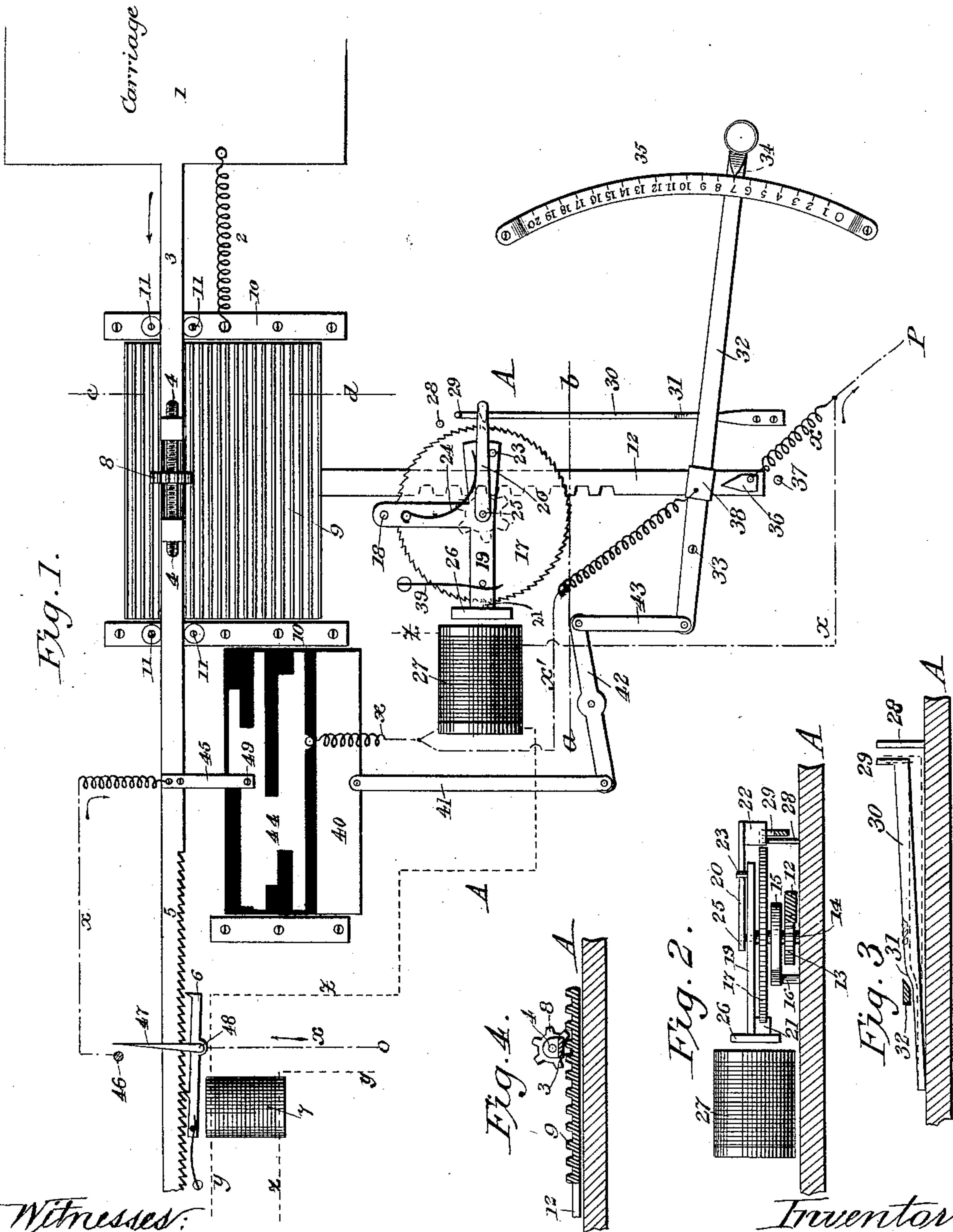


(No Model.)

J. A. WATSON.  
FEEDING AND JUSTIFYING MECHANISM.

No. 435,338.

Patented Aug. 26, 1890.



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# UNITED STATES PATENT OFFICE.

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## FEEDING AND JUSTIFYING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 435,338, dated August 26, 1890.

Application filed November 21, 1889. Serial No. 331,083. (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 Feeding and Justifying Mechanism; and I do declare the following to be a full, clear, and exact description of my invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, which form part of this specification.

My invention relates to feeding mechanism, and it is particularly applicable as a means of justifying in matrix-machines of that class which make matrices by successive single impressions of the type-dies upon the matrix material. I shall therefore describe it as a justifying mechanism, although it will be understood that the invention may be applied to other machines requiring fine feed-adjustment, such as dividing-engines, gear-cutters, and the like.

Heretofore justifying has generally been accomplished in matrix-machines by throwing in the extra space necessary to justify by manipulation of one or more ordinary space-keys. This hand-work is found to be tedious and requires constant effort and care on the part of the operator to prevent errors.

It is the object of my present invention to provide justifying mechanism which shall be entirely automatic in its operation, the only action required on the part of the operator being the touching of a key or setting of an index corresponding to the number of extra units of space to be thrown in.

In the accompanying drawings, Figure 1 is a plan view. Fig. 2 is a section on the line *a b* of Fig. 1. Fig. 3 is a side view of the variable feed-stops, and Fig. 4 is a section on the line *c d* of Fig. 1.

I have represented the matrix-material carriage 1 diagrammatically and partly broken away, as it forms no part of my present invention, and may be of any desired form. It is impelled in the direction of the arrow by a spring 2 or other suitable motor.

5 is an ordinary feed-rack, and 6 an ordinary escapement device pivoted at 48 and operated by a magnet 7 to feed the carriage for the usual word and letter spacing. The

rack 5 is connected to the carriage through the medium of a right-and-left-hand screw 4, the ends of which are threaded into offsets in the adjacent ends of the rack and a bar or rod 3, which is attached to the carriage. Rigidly fixed to the screw 4 at its central point is the pinion which engages the teeth of an elongated rack 9. The rack 9 slides in suitable guides, as 10, and the bars 3 and 5 are provided with suitable guides, as the rolls 11. It will be seen that when the rack 9 is stationary the movements of the rack 5 will be communicated to the carriage unchanged, the pinion sliding in the teeth of rack 9. It will also be evident that if the rack 5 remain stationary and the rack 9 be moved a proportional movement of the carriage will result. The screw 4, pinion 8, and rack 9 and their actuating mechanism, therefore, form an independent feeding device for the carriage, the movements communicated by it to the carriage being added to or subtracted from the movements imparted by the ordinary feeding device 5 6 7, according as the two feeding devices are operated in corresponding or reverse directions. The main or ordinary and the supplemental feeding devices are distinct from each other, each being complete in itself, and I shall use the term "distinct" hereinafter in the claims to differentiate the present invention from old forms of machines, in which different keys or levers operate upon the same feeding device to produce different amounts of feed movement.

In matrix-making machines the ordinary feeding device feeds the usual word and letter spaces, and it is immaterial to the present invention whether the letter-spacing be uniform or variable.

The supplemental feeding device is adapted to feed automatically the amount of extra space necessary for justification, and it is operated and controlled as follows: A rack 12, attached to rack 9, engages the pinion 13 on the sleeve 14, which surrounds a post set into the main frame A of the machine. On the upper end of sleeve 14 is a ratchet-wheel 17. The rack 12 is impelled in the direction of rack 9 by a coil-spring 15, one end of which is attached to sleeve 14 and the other to a post 16 set in the main frame.

On a post 18 is pivoted a T-shaped vibrat-



ing lever 19, bearing upon one of its arms a stiff pawl 21 and an armature 26, and on the other arm a stop 23 to limit the movements in one direction of a lever 20, carrying a limber pawl 22, said lever 20 being pivoted to lever 19 at 25. A spring 39 holds the stiff pawl normally in engagement with the ratchet-wheel, and a spring 24 engages lever 20, pressing it against stop 23.

29 is a movable stop attached to one end of a spring-arm 30, the other end of said spring-arm being attached to the main frame.

32 is a lever pivoted to the main frame at 33 and carrying an index or point 34 in proximity to a dial 35. The dial 35 is graduated and marked to represent the various amounts of extra space to be thrown in in justifying.

The lever 32 may be obviously adjusted by other means than the dial and index without departing from the principle of my invention; but I prefer to use the dial on account of its simplicity and convenience.

The operation of the supplemental feeding device so far as described is as follows: An electric circuit is passed through the magnet 27 and connections, with the ordinary feeding device arranged so that magnet 27 is energized each time the ordinary feed moves for a letter or space between words. This may be accomplished by placing magnets 7 and 27 in the same circuit Z. At each impulse of the electric current the armature 26 is attracted, the ratchet 17 is released by the stiff pawl 21 and engaged by the limber pawl 22, and the spring 15 turns the ratchet 17 and pinion 13 until the lever 20 is stopped by one of the stops 28 or 29. On the release of the armature the spring 39 causes the release of the limber pawl and the re-engagement of the stiff pawl, and the spring 24 causes the lever 20 to assume its original position against the stop 23. In this manner the rack 9 is fed along until the stop 36 upon the rack 12 strikes an abutment-block 38 upon the lever 32, after which no further feeding can take place. The lever 32 is arranged so that the spring 15, acting through rack 12 and block 36, shall not have power to move it. The dial is so graduated and the parts so proportioned that when the index is set at the number of units of space to be thrown in the distance between parts 36 and 38 will be just sufficient to allow the supplemental feed to throw in the desired amount. At the end of each line the rack 12 may be returned by swinging the lever 32 to zero on the dial, or in any other convenient manner. The stop 37 limits its rearward movement.

It is evident that when a small amount of space—say one to ten units—is to be thrown in a smaller amount may be added to each character and space than when a larger amount is to be thrown in. To take advantage of this fact I have made the supplemental feed variable. When throwing in from one to ten units, the movement of the ratchet-wheel is limited to two teeth by the stop 29, which is normally

in the path of the lever 20. When the index 34 is set for more than ten units, the lever 32, riding over cam 31 on arm 30, throws stop 29 out of the path of lever 20 and the ratchet is allowed to feed four teeth at a time. In the same manner I may add other movable stops, and further divide the supplemental feed movements. By using three movable stops I am enabled to justify lines of common newspaper print by adding one four-hundred-and-eightieth of an inch to each character and space when throwing in from one to five extra units, one two-hundred-and-fortieth for six to ten extra units, one one-hundred-and-sixtieth for eleven to fifteen extra units, and one one-hundred-and-twentieth of a unit for sixteen to twenty extra units.

The mechanism so far described begins to throw in extra space at the beginning of each line, and as the extra space would ordinarily extend not entirely through the line this tends to give the left side of the column a somewhat lighter shade than the right side. To obviate this defect I have devised means as follows to bring the supplemental feed into operation at varying periods in the travel of the carriage, so as to locate the spaced portions of different lines in different positions with respect to the center line of the column.

A slide 40 is connected with index 34 by a rocking bar 42 and links 41 43, or other suitable connection, so as to reciprocate simultaneously with said index. On slide 40 is mounted an insulated plate 44, of irregular form, as shown. A spring-finger suitably insulated from rack-bar 5 is mounted thereon, and provided at its free end with a depending conical contact-point 49, which travels over plate 34 in contact therewith. A finger 47, suitably insulated from escapement device 6, is mounted thereon near its pivotal point 48. The free end of this finger 47 once in each movement of the escapement 6 comes in contact with an insulated post 46. The ordinary feed 6 7 may be operated by a circuit Y or other suitable means. The supplemental feed in this case is operated by an independent circuit X, which starting at O passes through finger 47, post 46, finger 45, plate 44, and magnet 27 to B. It is evident that the point at which the supplemental feed will be brought into action will depend upon the position of the plate 44, which is controlled by the index, the finger 45 being moved over the plate 44 by the rack 5.

The parts 36 and 38 may be insulated and a branch circuit X' connected thereto, so that when said parts come in contact the current will pass through branch circuit X' and the magnet 27 will be cut out and cease to act.

It is to be understood that the present invention is not limited to the specific mechanism shown, as many modifications thereof will suggest themselves to those skilled in the art.

It is desirable to have the supplemental feed operate simultaneously with the ordi-



nary feed, and an electric connection between the two is a convenient mode of accomplishing this end; but the same result may be easily had by using a mechanical connection.

5 The circuit Z is shown as a modification of the electrical connections, and is of course to be left out when the circuits X and Y are used.

In most matrix-making machines provision is made for removing one set of type-dies and  
10 inserting another set corresponding to a different style or font of type.

In order to adapt my invention to different fonts of type, I use differently-graduated dials corresponding to the different fonts.

15 Mechanism for moving the carriage relatively to the feed-rack is not claimed herein broadly, as this feature forms the subject of a separate application, Serial No. 331,084, filed November 21, 1889.

20 I claim—

1. In combination, a carriage, a main feeding device, and a distinct supplemental feeding device.

2. In combination, a carriage, a main feeding device, and a distinct supplemental feeding device, said feeding devices being arranged to operate simultaneously.

3. In combination, a feeding device for word and letter spacing, and a distinct supplemental feeding device adapted to automatically distribute surplus space so as to cause lines of print to justify.

4. In combination, a carriage, a feeding device for word and letter spacing, and a distinct variable supplemental feeding device.

5. In combination, a carriage, a feeding device, a distinct variable supplemental feeding device, and means for controlling the extent of the movements of said supplemental feeding  
40 device.

6. In combination, a carriage, a feeding device for word and letter spacing, a supplemental feeding device, and means whereby said supplemental feeding device may be automatically brought into action at different stages in the travel of the carriage.

7. In combination, a carriage, a feeding device for word and letter spacing, a supplemental feeding device, and means for automatically stopping such supplemental feeding device when the desired amount of surplus space has been distributed.

8. In a justifying mechanism, a dial, an index-lever, and a variable-feed mechanism  
55 having the extent of its movements controlled by said index-lever, whereby a line may be automatically justified in accordance with a previous setting of the lever.

9. In combination, a carriage, a feed-rack therefor, a screw uniting said carriage and feed-rack, a pinion on said screw, and a rack engaging said pinion.

10. In combination, a carriage, a feeding de-

vice for word and letter spacing, justifying mechanism distinct from said feeding device, 65 and a setting device having suitable graduations or marks for controlling said mechanism throughout the operation of forming a line of print in accordance with the graduation to which it is adjusted before beginning 70 said operation.

11. The combination, in a matrix-machine, of an automatic justifying mechanism adapted to be set at the beginning of the line, and a setting device arranged in connection there- 75 with, said device comprising a movable part and suitable graduations or marks for its adjustment.

12. The combination, in a matrix-machine, of an automatic justifying mechanism adapted to be set at the beginning of the line, and a setting device arranged in connection there- 80 with, said device comprising a movable part having an index and suitable graduations or marks for its adjustment. 85

13. The combination, in a matrix-machine, of an automatic justifying mechanism adapted to be set at the beginning of the line, and a setting device arranged in connection there- 90 with, said device comprising a pivoted lever bearing an index and a dial for its adjustment.

14. In combination with an automatic justifying mechanism, differently-graduated dials whereby the said mechanism is adapted 95 to different fonts of type.

15. In a justifying mechanism, a contact-point movable in one direction, in combination with a contact-plate movable transversely to the line of motion of said point. 100

16. In combination, a main feeding device, a distinct supplemental feeding device, and means controlled by the main feeding device for operating the supplemental feeding de- 105 vice.

17. In combination, a carriage, a main feeding device, an electrically-operated supplemental feeding device, and a circuit for the latter controlled by the main feeding device.

18. In a justifying mechanism, a main feeding device, a supplemental feeding device, and stops for variably limiting the movement of said supplemental feeding device. 110

19. The combination of a carriage or other movable element, and two distinct feeding de- 115 vices connected to said element and arranged to move it a distance equal to the sum or difference of the movements of the feeding devices, according as they are operated in corresponding or reverse directions, substantially 120 as described.

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