

No. 753,336.

PATENTED MAR. 1, 1904.

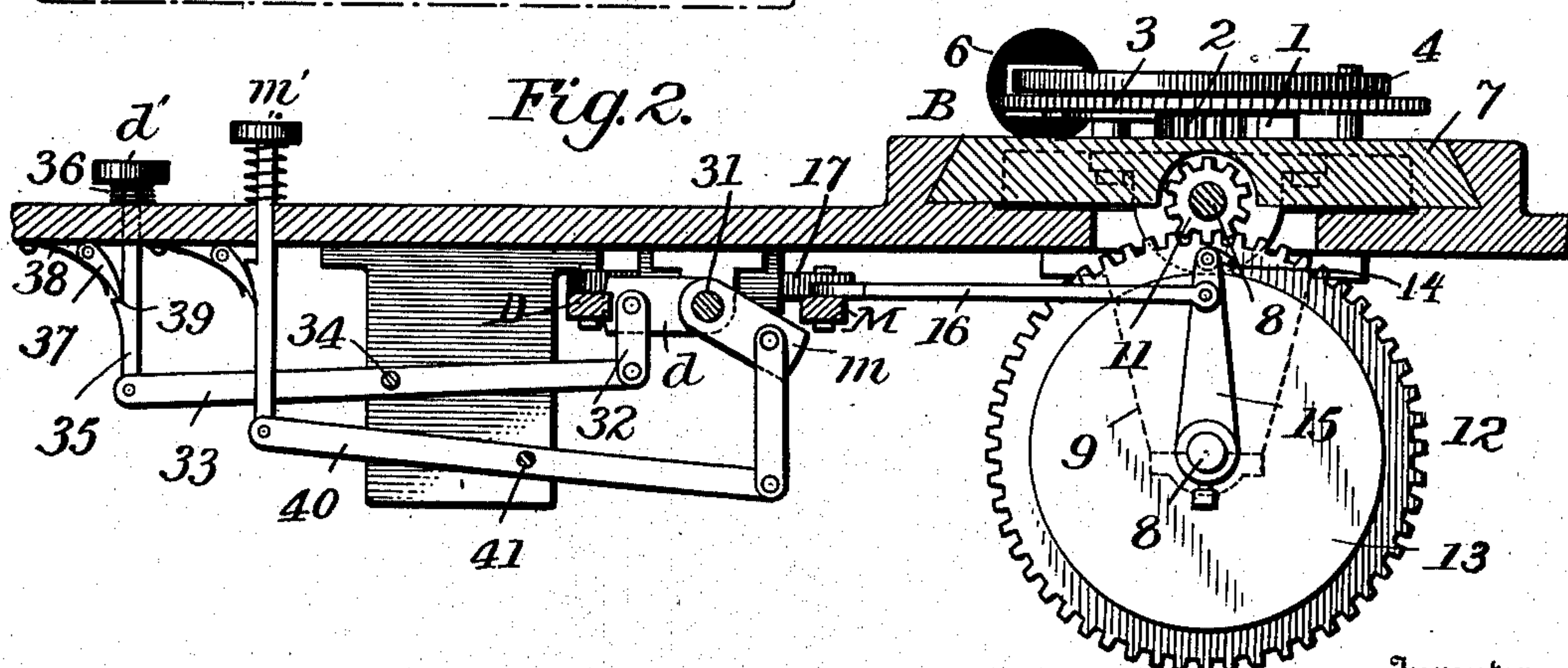
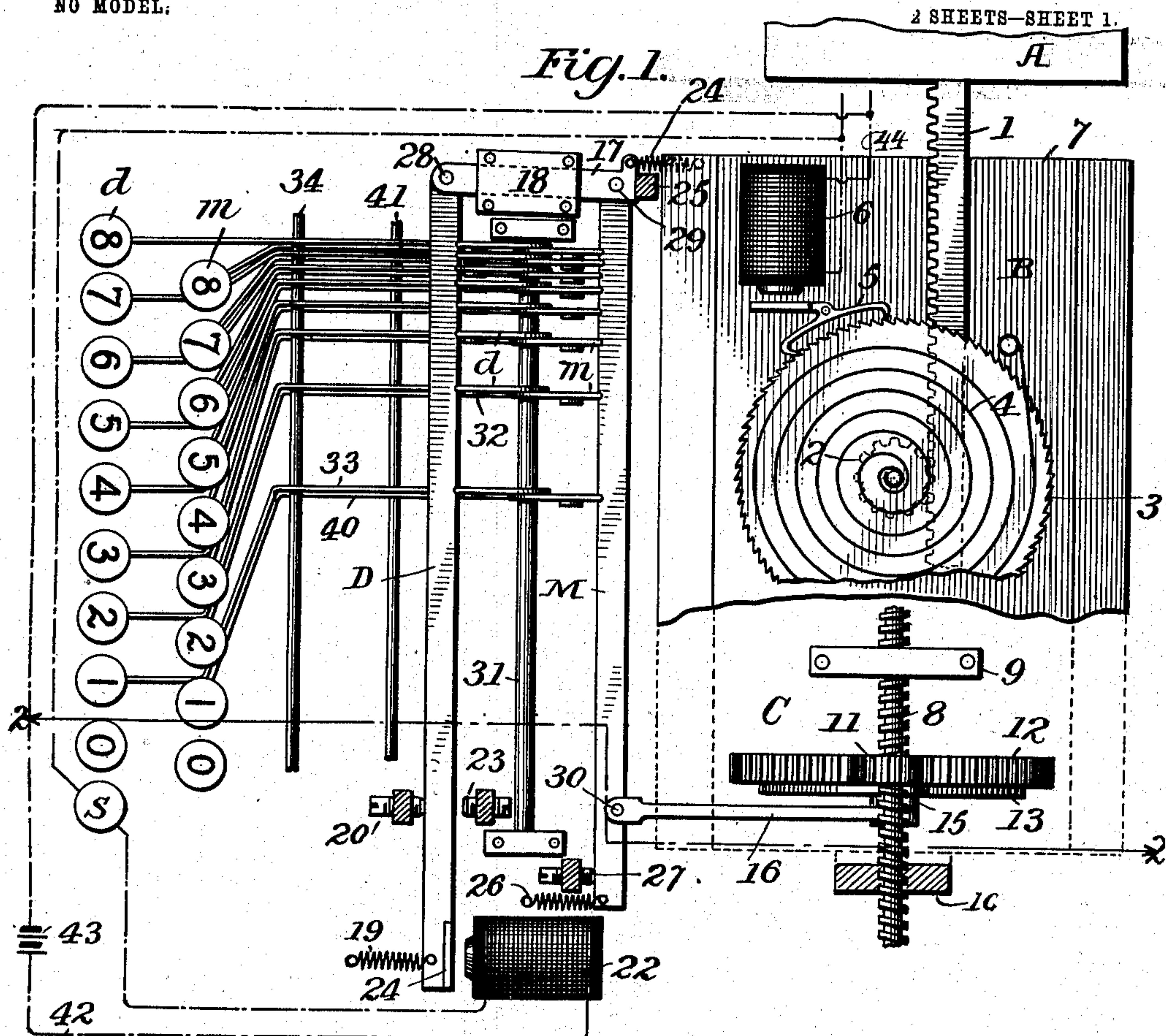
J. A. WATSON.

JUSTIFYING DEVICE FOR COMPOSING MACHINES.

APPLICATION FILED AUG. 24, 1897.

NO MODEL:

2 SHEETS—SHEET 1.



Witnesses

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2 SHEETS—SHEET 2.

Fig. 3.

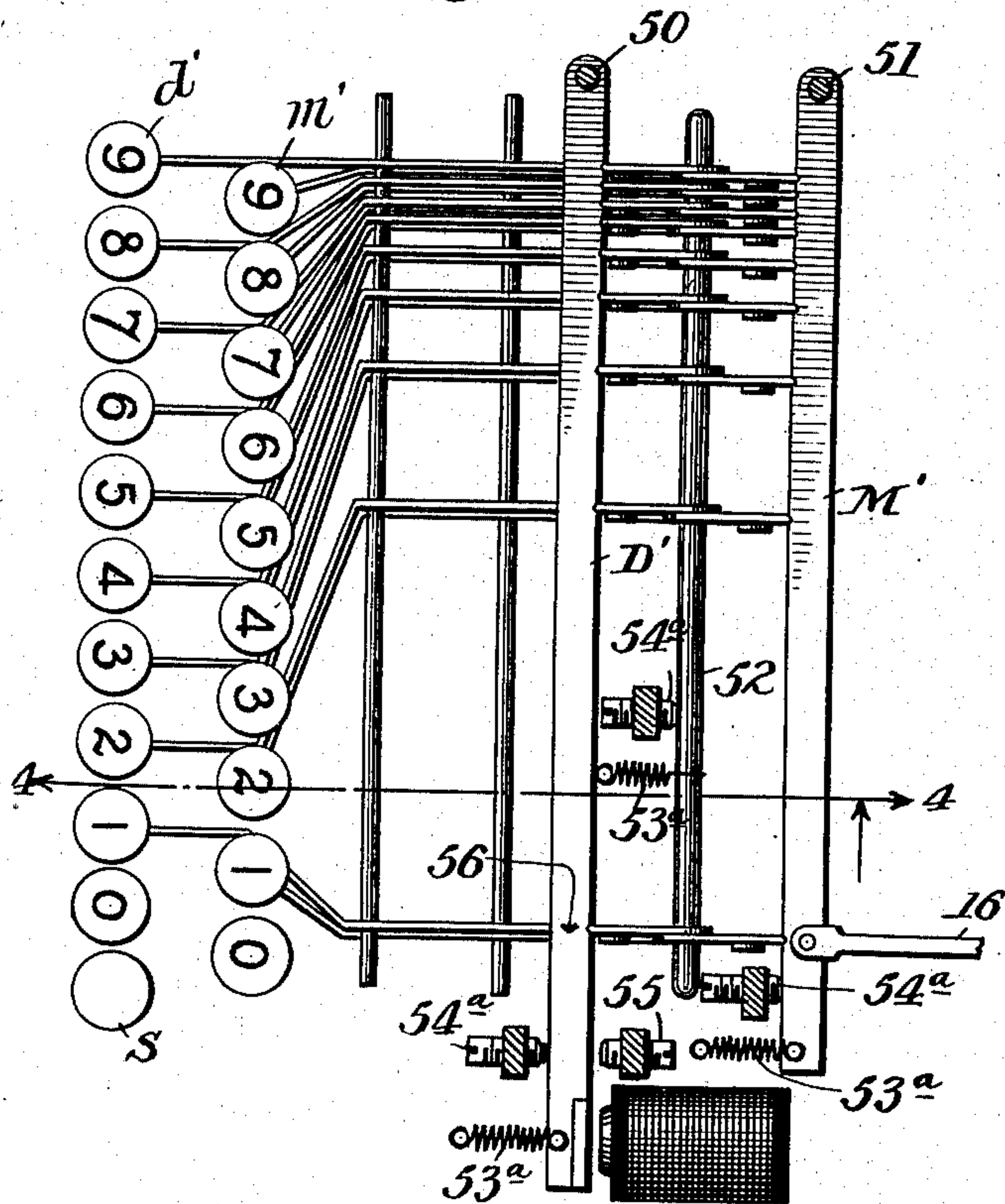
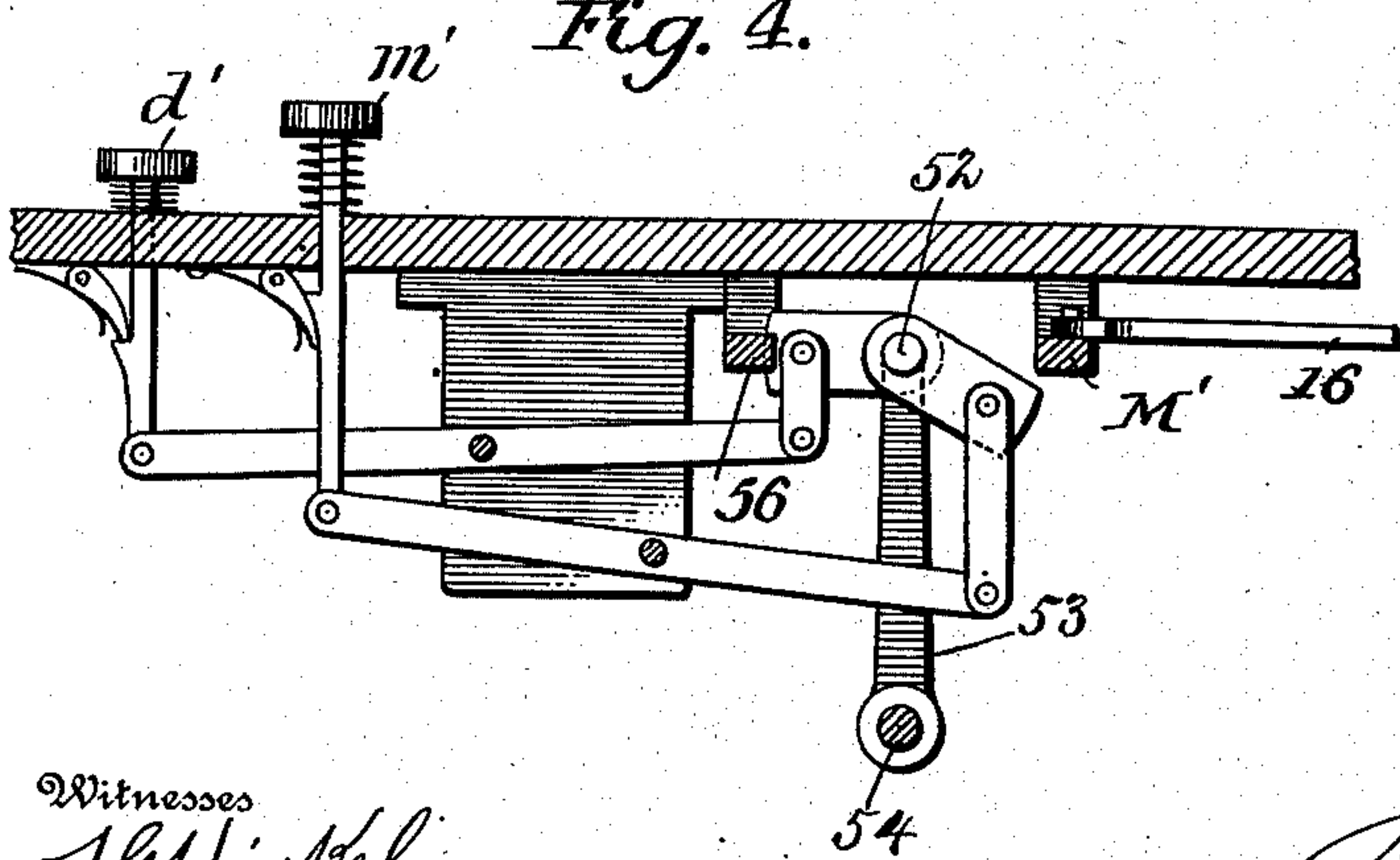


Fig. 4.



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UNITED STATES PATENT OFFICE.

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TER, CONNECTICUT, A CORPORATION OF NEW JERSEY.

JUSTIFYING DEVICE FOR COMPOSING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 753,336, dated March 1, 1904.

Application filed August 24, 1897. Serial No. 649,350. (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 Justifying Devices for Composing-Machines, of which the following is a specification.

The present invention relates to justifying mechanism for matrix-making and other composing-machines. As illustrated in the drawings, it is applied to matrix-making machines; but it will be understood that certain features of the invention are applicable to other composing-machines, such as those which cast or set type.

The object is to justify lines of composition by automatically and uniformly increasing or decreasing the normal word-spaces of the lines the amount necessary to bring the lines to the standard length or column width.

The invention will be described in detail in connection with the accompanying drawings, in which—

Figure 1 is a plan view of justifying mechanism embodying my invention. Fig. 2 is a section on the line 2 2, Fig. 1. Fig. 3 is a plan view illustrating a modification; and Fig. 4 is a section on the line 4 4, Fig. 3.

The justifier requires to be "set" either manually or automatically prior to the final production of each line. As illustrated, it is adapted to be set by keys and key-levers. It is to be presumed that before setting the justifier for any given line the number of word-spaces in that line and aggregate width of the word-spaces necessary to justify have been calculated or, what is practically the same thing, that the number of word-spaces and the total variation space or amount to be added to or subtracted from normal spaces has been calculated. In the case illustrated in the drawings I apply the justifier to a supplemental feeding device, which produces a movement additional or supplemental to that of the main feeding device.

In Figs. 1 and 2 A indicates a matrix-carriage which is connected by a rack 1 and pinion 2 with a ratchet-wheel 3, which is urged

to feed the carriage forward by a spring 4 and controlled by a suitable escapement 5, operated by a magnet 6. Any suitable feeding device may be substituted for that illustrated, such device being mounted upon the slide 7. The parts 1 to 6, inclusive, and their equivalents I shall designate as the "main" feeding device B. The slide 7 is moved by a supplemental feeding device C, which, as shown, consists of a right-and-left screw 8, one end of which operates on the threaded bearing 9 on the slide 7 and the other end operates in a fixed bearing 10 upon the main frame. The screw is driven by pinion 11 and gear 12, the friction-wheel 13, and coöperating-pawl 14, the friction-wheel 13 being connected to gear 12. The pawl is carried on an arm 15, which is connected by a link 16 to the justifying-levers, to be presently described. The pawl 14 engages the disk 13 frictionally, so that the slightest movement of the pawl will be communicated to the disk and through it to the slide 7 and matrix-carriage A.

The justifier proper consists, as shown in Figs. 1 and 2, of a dividing-lever D, a multiplying-lever M, two series of fulcrum d m , adapted to be applied to said levers, respectively, and two series of keys d' m' for operating said fulcrum, respectively. The dividing-lever D is pivoted to a connecting-rod 17, which slides in a guide 18. The opposite end of the lever is normally drawn back by a spring 19 against an adjustable stop 20, and it is provided with an armature 21 adjacent to a magnet 22, by means of which it may be drawn forward against a stop 23. The stops 20 and 23 may be adjusted so that the movement of the dividing-lever at the stops will be equal to the movement required to be given the connecting-rod 16 in order to produce a unit movement of the matrix-carriage A. The lever M and slide 17 are drawn to the right by a spring 24 against a stop 25, and the other end of lever M is drawn to the left by a spring 26 against an adjustable stop 27. The fulcrum d are arranged along the lever D at regular fractions of its effective length, which is the distance between the stop 20 and pivot 28, the first fulcrum being one-half of

this distance from the pivot 28, the second at one-third, the third at one-fourth, &c. The fulcra *m* are similarly arranged along the lever *M*, being placed at fractions of its effective length, which is the distance between pivot 29 and pivot 30. The fulcra *d m* are blades pivoted on a fixed rod 31. The fulcra *d* are connected with the keys *d'* through links 32, levers 33, pivoted at 34, and key-stems 35. The keys are normally raised by springs 36. When one of the keys is pressed down and a fulcrum raised, the parts are locked in this position by a locking-blade 37, operated by a spring 38 and engaging a shoulder 39. The blade 37 extends past the stems 35 of all of the keys. As one key is depressed the blade 37 is thrown out by the shoulder, and the previously-operated key is released automatically. To release all of the fulcrum-keys, a pair of dummy keys *o o* are provided, having stems with shoulders 39. The connections between the keys *m'* and the fulcra *m* are exactly the same as those just described, as shown in Fig. 2, their levers 40 being fulcrumed on a rod 41.

S indicates a space-key which is used to close a circuit 42, which energizes the magnets 6 and 22, the circuit being provided with a battery 43. The magnet 6 is also included in a branch circuit 44, which energizes the magnet to effect the letter-spacing.

The operation is as follows: Assuming, first, that a line has four word-spaces and there are four units to be distributed in these spaces to justify the line, the keys numbered "4" are depressed, bringing into operation the fulcra *d m*, which divide the levers in the proportion of one to four. Then each time the space-key *S* is operated the dividing-lever will move the slide 17 one-fourth of a unit movement at the stop 20, and the multiplying-lever will move the connecting-rod 16 four-fourths or one unit. As in this case a full unit is to be added to each space, it will be evident that any pair of corresponding keys will answer the purpose. Thus the keys 11 or 22 would produce the same effect. Assuming, again, that the line has five spaces and three units to be added to justify—that is, three-fifths of a unit to each space—the key *d'* marked "5" and the key *m'* marked "3" are depressed. This will have the effect of moving the slide 17 one-fifth of a unit and the connecting-rod 16 three-fifths of a unit each time the space-key is operated. In the mechanism illustrated the space-key *S* also operates the main device *B*, and the movement of the supplemental feed *C*, which takes place simultaneously, is added to the movement of the main feeding device *B*. It will be evident that any multiple or fractional movement may be given to the supplemental feed between eight units and one-eighth of a unit by the devices shown and that this range of movement may be largely increased by duplicating the keys and fulcra. By the divid-

ing-lever alone and its fulcra the amount of movement permitted between the stops 20 23 is divided by the number of spaces in the line, and if this amount be the total variation space then the proper fractional movement will be given to the slide 17. In other words, in some instances the multiplying-lever might be dispensed with and the justifying movement taken directly from the slide 17 or the pivot 28. The feed device *B* is arranged to feed the carriage for a minimum space each time the space-key is operated, and the supplemental device *C* adds the amount necessary to justify, which amount may render the final justified spaces either less or greater than the normal spaces, it being assumed that the space movement of the device *B* is less than the normal. When a line requires no supplemental spacing to justify it, the keys *o o* are depressed and all the fulcra withdrawn from the justifying-levers.

In Figs. 3 and 4 the arrangement of justifying-levers and fulcra is modified. The levers *D' M'* are connected to fixed pivots 50 51. The fulcra are pivoted on a rod 52, carried by rocking arms 53, which turn on fixed pivots 54. The arrangement of the fulcra and key-levers is the same as in Figs. 1 and 2, with the exception that the fulcra of the keys 1 are placed opposite link 16, where the unit movement takes place. The fulcra of the keys 2 are placed half-way between this point and pivots 51, &c. The levers and the bar 52 are drawn to the left by springs 53^a, and their movement is limited in this direction by stops 54^a. In the opposite direction the movement of the lever *D'* is limited by a stop 55. In operating this form of the invention the keys are depressed, as in the instances above described, to set the justifier for a given line. Then as the space-key is struck the dividing-lever is moved to the right, the fulcrum-support 52 is also moved to the right a fraction of the movement of the lever *D'* at its unit-point 56, and the connecting-rod 16 is moved to the right a multiple of the movement of the support 52.

The supplemental feeding device is, broadly considered, not novel, being described and claimed in my United States Patent No. 435,338. I have shown one form of such a feeding device in the present instance to illustrate one way of using the multiplying and dividing levers in justifying mechanism. It will be evident, however, that the principle upon which these levers and their fulcra operate may be adapted in various forms to different composing-machines, and I do not, therefore, limit the following claims to the precise construction and arrangement herein illustrated and described.

I claim—

1. In a justifying mechanism for composing-machines, the combination of a dividing and a multiplying lever, means for applying a fulcrum to the dividing-lever at a point cor-

responding to the number of spaces in the line to be justified and means for applying a fulcrum to the multiplying-lever at a point corresponding to the variation-space, substantially as described.

2. In a justifying mechanism for composing-machines, the combination of multiplying and dividing levers, means for communicating movement from one lever to the other, and means for communicating movement from the second lever to the spacing mechanism, substantially as described.

3. In a justifying mechanism for composing-machines, the combination of multiplying and dividing levers, the connecting-link between said levers and fulcra arranged to be applied to said levers at different points, substantially as described.

4. In a justifying mechanism for composing-machines, a slide, means, such as the spring 24, for drawing said slide in one direction, a dividing-lever pivoted to the slide at one end, means for moving the opposite end of the lever, and means for applying a fulcrum to said lever at fractional parts thereof, the fraction selected for any given line corresponding to the number of spaces in that line, substantially as described.

5. In a justifying mechanism for composing-machines, the combination of a main feeding device, a supplemental feeding device, and the multiplying and dividing levers connected to the supplemental feeding device, substantially as described.

6. In a justifying mechanism for composing-machines, the combination of a main feeding device mounted on a movable support and a supplemental feeding device arranged to move said support, substantially as described.

7. In a justifying mechanism for composing-machines, the combination of a main feeding device mounted upon a movable support, a supplemental feeding device adapted to move said support, a dividing-lever, means for applying fulcra to said dividing-lever at points corresponding to the number of spaces in a line to be justified and connections from said dividing-lever to the supplemental feeding device, substantially as described.

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

JAMES A. WATSON.

Witnesses:

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S. A. TERRY.