(No Model.) 2 Sheets—Sheet 1.

P. F. COX.

APPARATUS FOR AUTOMATICALLY JUSTIFYING TYPE.

No. 528,857. Patented Nov. 6, 1894.

Fig. 2.

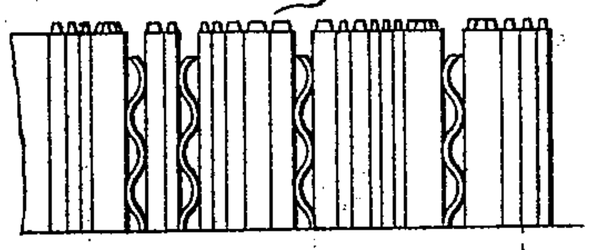

Fig. 3.

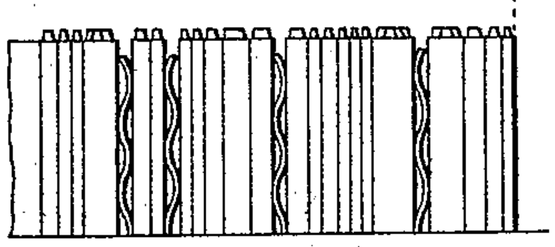

Fig. 1.

Witnesses:
M. C. Fowler
James R. Mansfield.

Inventor:
Paul F. Cox
by Alexander & Dowell.
Attorneys.

(No Model.) 2 Sheets—Sheet 2.

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Fig. 4.

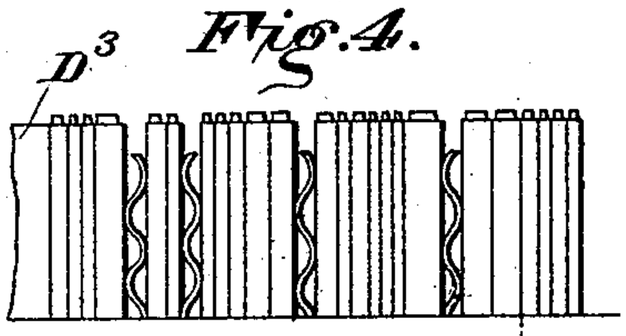

Fig. 5.

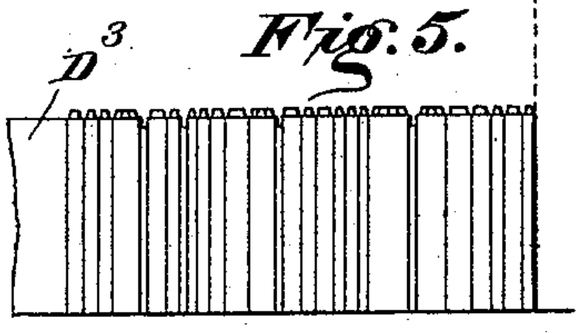

Fig. 6.

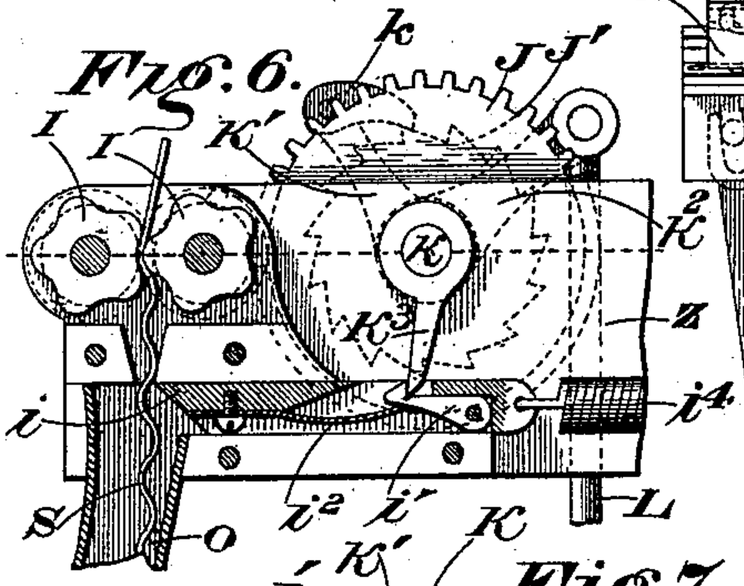

Fig. 7.

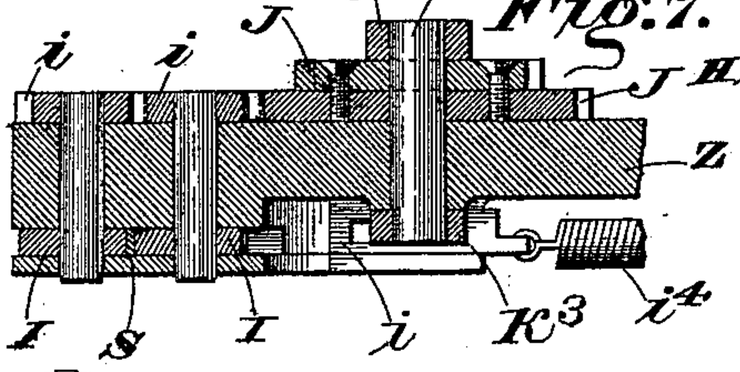

Fig. 9.

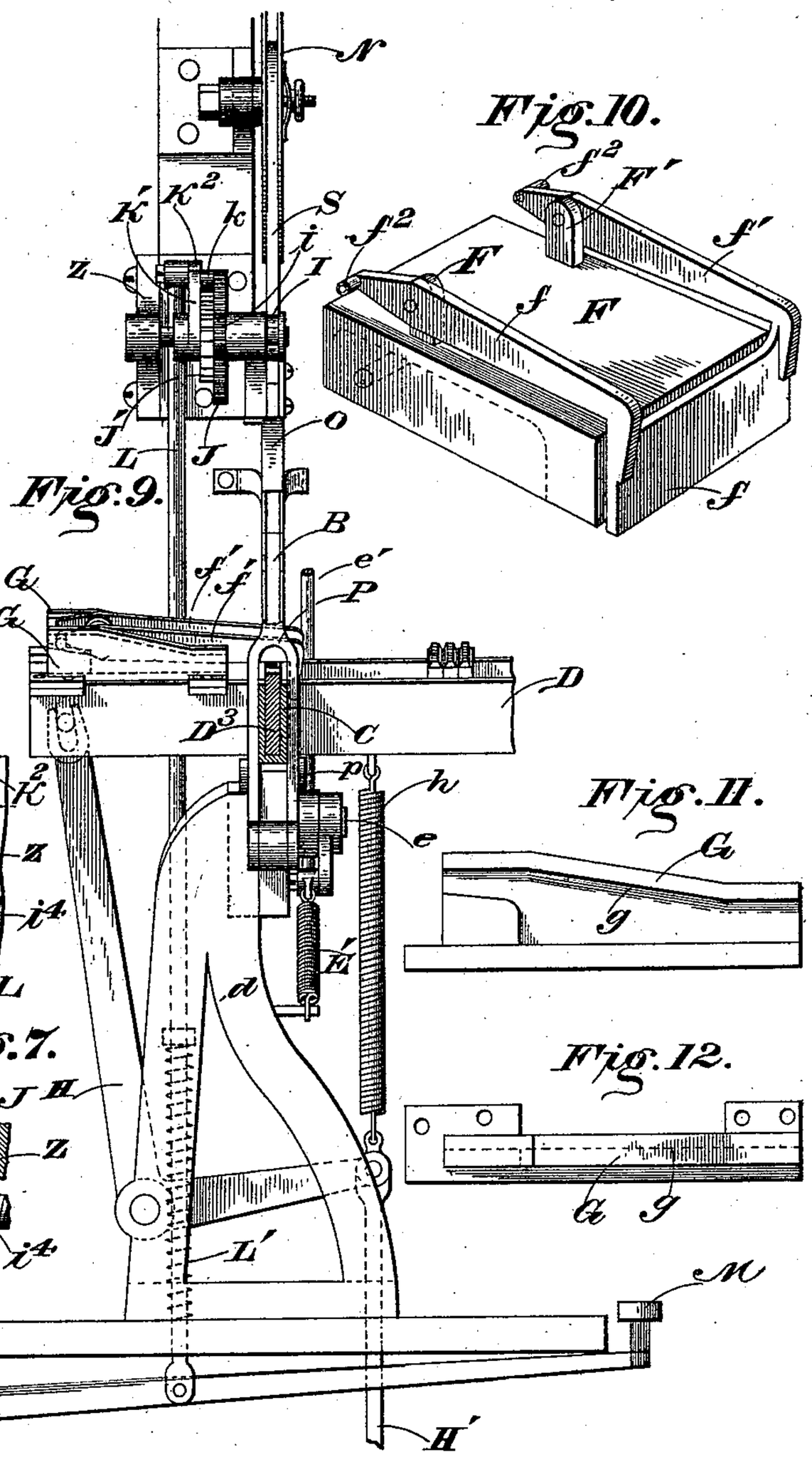

Fig. 10.

Fig. 11.

Fig. 12.

Fig. 8.

Witnesses:
M. C. Fowler
James R. Mansfield.

Inventor:
Paul F. Cox
by Alexander & Dowell.
Attorneys.

UNITED STATES PATENT OFFICE.

PAUL FLEMMING COX, OF BATTLE CREEK, MICHIGAN, ASSIGNOR TO THE COX TYPE SETTING MACHINE COMPANY, OF CHICAGO, ILLINOIS.

APPARATUS FOR AUTOMATICALLY JUSTIFYING TYPE.

SPECIFICATION forming part of Letters Patent No. 528,857, dated November 6, 1894.

Application filed March 5, 1894. Serial No. 502,313. (No model.)

To all whom it may concern:

Be it known that I, PAUL FLEMMING COX, of Battle Creek, in the county of Calhoun and State of Michigan, have invented certain new and useful Improvements in Apparatus for Automatically Justifying Type; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form part of this specification.

This invention is an improved means and apparatus for automatically justifying type, adapted to be used with type setting machines, and especially in connection with the improved type setting machine shown in my application for Letters Patent filed March 21, 1894, Serial No. 502,099.

The principal object of the invention is to provide means whereby each line of type can be mechanically justified. In the machine shown in my application aforesaid, and in many other type setting machines, the types are composed or assembled in a long receiving channel and each line is spaced out and justified by hand, generally a second operator being employed for this work. The present invention will obviate the need of the assistant operator, and relieve the single operator of all manual justifying of the lines, this being accomplished very rapidly by the mechanism under his control, saving much time and consequently greatly increasing the rapidity or capacity of the machine.

In connection with this invention the ordinary straight spaces are discarded and instead thereof laterally yielding spaces are used which normally will separate adjoining types or words more than is necessary, but can be compressed laterally to about the thickness of ordinary spaces, thereby allowing a mechanical automatic justification of the composed matter as hereinafter fully described.

In this invention every line is primarily "over-spaced" when first set; each space being bent or corrugated to such an extent that its width is equal to or in excess of the width of the widest or "en" space of the type font, while the thickness of the body of the corrugated space before being bent and when straightened out, is equal to the average or even thin space. Thus a line "set out" will "over run" one, two or three types, or a syllable perchance, but the total yielding capacity of the bent spaces exceeds the "over run" of the line. Consequently by compressing the line lineally the spaces are straightened more or less until the line will fit closely in the galley or column wherein it is placed with other lines. This lateral compression can be affected by simple mechanical means, and the resultant composed matter is justified or spaced, in a manner no hand work can equal, as every line can be brought to exactly equal width and most perfectly justified. The compressible spaces are to be made of any suitable non-resilient material such as lead, which when once compressed will retain its form and will not spring back and destroy the justification of the line after the compression is removed therefrom.

In the drawings I have shown a complete attachment for a type setting machine wherein the types after alignment can be mechanically justified by the depression of a lever, then the line automatically moved up against previously composed matter by the operation of another lever, and the compensating spaces made and delivered by the depression of another lever, so that the operator of the machine will not have to handle the types or spaces at all.

The invention consists, first, in means for automatically producing compressible self justifying spaces as needed in connection with a type setting machine; second, in means for shifting the justified line out of the way, and finally the invention further consists in novel details of construction and combinations of parts hereinafter described and set forth in the claims.

Referring to the drawings:—Figure 1 represents a detail view of a portion of the machine shown in my aforementioned application, showing the composing and justifying devices, and means for making the self justifying spaces. Figs. 2 and 3, and 4 and 5 illustrate lines of type before and after justification. Figs. 6, 7 and 8 are details of the space making device. Fig. 9 is a part side view

and part sectional view of Fig. 1. Fig. 10 is a detail view of the rule devices. Figs. 11 and 12 are detail views of the cam blocks for regulating the rise and fall of the rule.

The type setting machine indicated in the drawings is constructed like that shown and described in my application for Letters Patent above mentioned, the types being ejected feet foremost upon endless carrier belts A, *a*, by which they are directed into a chute B, through which they pass into a race-way C, which opens directly into the side of a galley D, mounted upon a supporting bracket *d*, and slightly inclined sidewise, and lengthwise, to facilitate the movement of the type therein. The types fall into the race-way feet foremost directly in front of a vibrating loader or setter E, which is mounted on a rock shaft *e*, and vibrated back and forth by means of a rod *e'* (having a friction roll e^2 engaging a cam A^2 on the shaft of one of the wheels A' carrying the belt A), and a spring E' as shown, the cam positively rocking the setter inward so that it forces the type into the galley, and the spring retracting it so as to allow other type to drop in position to be thereby moved into the galley.

Detailed description of the mechanism for ejecting the types, and delivering them to the setter, is unnecessary herein, not being part of present invention.

As the type enter the galley they pass between the end of a plunger or sliding block F, and a rule *f*, attached to the plunger by horizontal levers *f'*, which are pivoted near their rear ends to ears F', F', at the sides of the plunger. The rule normally stands just opposite the inner end of the plunger, and sufficiently removed therefrom to permit the entrance of a line of type therebetween, and the plunger is normally held in such position in the galley that the space between it and the rule forms a prolongation of the race way and the types are moved therein by the setter as indicated in the drawings. An adjustable slide D^3 may be slipped in between the plunger and rule at the commencement of each line, and gradually forced out by the incoming types so that when a line is completed it will be out of the way, and the plunger and rule, with the line of type therebetween can be moved longitudinally of the galley so as to move the justified line out of the way; the line being justified as hereinafter described. As the plunger is moved forward in the galley the rule is lifted up, until it is clear above the types, and is kept in such position until it is moved back with the plunger sufficiently, to clear the type. It then drops behind the line of type, and the plunger and rule move back to first position for the reception of another line of type. This movement of the rule is effected by means of fixed cam blocks G, secured on the sides of the galley, having cam races *g* on their inner faces which are engaged by rollers f^2 on the rear ends of levers *f'*. As the plunger moves forward these rollers ride down the cam grooves, and consequently cause the elevation of the rule, and as the plunger moves back the rollers ride up the grooves and the rule is lowered. The plunger is moved downward by means of a crank lever H fulcrumed at its bend, one arm of the lever engaging the plunger, and the other arm can be depressed by hand, or, (by means of a rod H' which connects with a treadle not shown), by foot. A spring *h* is arranged to rock the lever H so as to bring the plunger back to normal position.

The justifying devices.

In the drawings is shown a device for making the self adjusting or justifying "spaces." These consist of a pair of small corrugating rolls I, I, journaled in a suitable framing Z attached to the side of the frame above the chute B. On the shafts of these rolls are intergeared pinions i^6, i^6, one of which meshes with a driving gear J loosely mounted on a shaft K journaled in the framing Z parallel with the rolls. On one face of said gear is a ratchet J' which is engaged by a pawl *k* on a crank arm K' affixed to shaft K, which shaft is rocked by means of a pitman L connected to one end of a crank arm K^2 on the shaft K, and at the other end to a key lever M, fulcrumed below the frame, and which can be depressed by hand so as to rock shaft K and thereby impart a rotary movement to rolls I. A spring L' returns the lever, pitman and rock shaft, to normal position when the key lever is released. Below the rolls I is a shearing blade *i* which is moved forward by means of a finger K^3 on shaft K, said finger engaging normally with a latch *i'* on the blade, which is held in engagement with the finger by a spring i^2 as shown. The blade is normally retracted by a spring i^4.

Above the rolls is a reel or spool N carrying a metallic ribbon S from which the spaces are made. The ribbon S is led between the rolls I, by which it is fed downward and simultaneously bent or crimped as shown. At each depression of key lever M the rolls are turned to draw a length of ribbon S from the reel sufficient to make a "space." Upon the first movement of shaft K the finger K^3 throws the blade *i* forward, severing a previously fed and crimped length of ribbon, and the further rotation of the rock shaft causes the finger to disengage latch *i'*, and blade *i* is thrown back to normal position while the rolls are rotated and fed forward another length of ribbon sufficient for a "space." When the rock shaft moves back to normal position the rolls are not affected, and finger K^3 re-engages the latch *i* which yields to permit its passing back. These parts are so arranged and located that when desired by depressing lever M a yielding "space" is sheared off the ribbon and drops down through a guide funnel or space channel O into the chute B, and there

through into the race-way in the desired position between the setter E and the last word awaiting to be spaced or separated from the next word or syllable.

Fig. 1 shows an "over set" line of type ready for proper justification, said line being "over spaced" to the extent of four letters. By means of a lever P and a link *p* (which loosely embraces the setter, so as not to normally interfere with the working thereof), the setter can be forcibly drawn into contact with the last letter of the line, and by further pressure it will compress the line of type straightening the yielding spaces more or less until the line will be reduced to the desired length to fit the galley, into which it is then shifted by the plunger mechanism above described. Where the setter is positively operated the lever P might be dispensed with, as the setter will itself space and justify the line by compressing the yielding spaces as each of the finishing letters of the line are composed and subsequently crowded back into the galley by the setter.

Figs. 2, 3, 4, and 5 illustrate various conditions of lines spaced and compressed. Fig. 2 shows an over spaced line and Fig. 3 shows the same line compressed until it is the desired length, although the yielding qualities of the spaces are not exhausted. Fig. 4 shows an over spaced line with yielding spaces, and Fig. 5 shows the same line compressed until the yielding spaces are fully straightened. These figures illustrate the amount of variable spacing that may be attained in the same line when spaced with our yielding spaces and compressed as desired.

Obviously the space making devices may be operated by stop mechanism that is simply tripped by pressing a key, also the spaces could be made previously and used as desired, or handled like ordinary types, and used with ordinary spaces, with beneficial effect also, though of course lessening the "adjustability" of the composed line.

With ordinary spaces if the line should be filled out in the middle of a non-divisible word, or one or two letters short, the operator has to separate types, and lead out the line, or remove thick spaces, and substitute thinner ones, but when using the yielding spaces, if the line is filled out by an incomplete word or syllable, the word can be completed, and the line solidified or condensed by pressure, as above described. As the spaces are alike compressible after pressure is applied to a line the several words and syllables will be found spaced equally, instead of irregularly, as would be necessary in ordinary hand justification.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination with mechanism for composing type and spaces in line, of mechanism for forming laterally compressible "spaces" and delivering them as needed to the composing devices during the setting operation whereby the line may be subsequently mechanically justified by lineal compression, substantially as set forth.

2. The combination in a type setting machine, of mechanism for making laterally compressible spaces as needed to space the words during the setting operation and mechanism for lineally compressing the line when completed, thereby mechanically justifying the line by the yielding of the spaces, substantially as described.

3. The combination in a type setting machine, of the receiving galley, the plunger and rule therein, between which the composed types are moved in line, with mechanism whereby when the line is completed the plunger and rule can be moved lengthwise of the galley so as to set the line of type out of the way, and mechanism whereby the rule is automatically shifted from front to rear of the line of type, substantially as described.

4. The combination of the galley, the plunger therein, the rule attached to the plunger, the devices for automatically raising and lowering the rule as the plunger is reciprocated in the galley, and means for directing a line of type into the galley, between the plunger and rule, substantially as described.

5. The combination in a type setting machine, of mechanism for composing type characters, and laterally compressible spaces, and mechanism for making such spaces, and for lineally compressing the line when completed, thereby mechanically justifying the line by the compression of the spaces, and mechanism whereby the justified line may be moved out of the way of the next succeeding line, substantially as described.

6. The combination in a type setting machine of the galley, mechanism for setting and aligning type and directing the same into the galley, a plunger and rule between which the incoming line of type is received, and mechanism for moving the line when completed forward in the galley, and simultaneously shifting the rule from front to rear thereof, substantially as set forth.

7. In a type setting machine the combination of the type setting mechanism, with mechanism for making spaces and delivering them to the setting mechanism as needed during the setting up of a line, substantially as described.

8. In a type setting machine the combination with type setting mechanism, of a mechanism for making yielding compressible "spaces" at the will of the operator, and delivering them to the setting mechanism as needed during the setting up of a line, substantially as described.

9. In a type setting machine the combination with type setting mechanism, of a mechanism for making yielding "spaces" at the will of the operator, and delivering them to

the setting mechanism, and means for lineally compressing the lines of type when completed whereby the line is automatically justified by the yielding of the "spaces," substantially as specified.

10. The combination with mechanism for composing type, of a pair of rolls, and a shearing device, a key lever and connections whereby upon the depression of said lever the shear and rolls are operated, to sever a "space" and means for delivering such space to the composing devices, substantially as set forth.

11. In combination with the composing mechanism of a type setting machine, of a "space" making mechanism consisting of means for feeding a space "ribbon" and means for severing it into suitable lengths for "spaces," a key, and connections whereby upon the depression of a key a "space" is severed and delivered to the composing devices, substantially as described.

12. The combination of the feed rolls, the driving gear thereof, its ratchet the rock shaft carrying a pawl engaging said ratchet, and means for rocking said shaft, with a shear blade, and means for operating it from the rock shaft, at the initial movement of the latter, and for retracting the blade immediately after it has operated, substantially as described.

13. The combination of the feed rolls, the driving gear thereof, mounted on a rock shaft and carrying a ratchet, the pawl mounted on said rock shaft, engaging said ratchet, and the key lever and connections for rocking said shaft; with the shear plate, the spring controlled latch thereon, and the finger on the rock shaft engaging said latch, substantially as described.

14. The combination in a type setting machine, of the type setting devices, with a "space" strip feeder, and mechanism for corrugating and severing "spaces" from said strip and delivering them to the setting mechanism at the will of the operator, substantially as described.

15. The combination in a type setting machine of mechanism for setting type; a key and mechanism for making "spaces" from a ribbon, whereby upon the depression of said key a space is severed and delivered to the setting mechanism, substantially as and for the purpose set forth.

16. In a type setting machine, the combination of mechanism for delivering type to a race-way, a galley for receiving the type from the race-way, a setter for forcing the type into the galley, and a mechanism for making and delivering "yielding" spaces to the setting mechanism as required in the composition of matter; with mechanism for lineally compressing the line of type when completed thereby mechanically justifying it by reason of the yielding of the "spaces" and mechanism for moving the justified line out of the way, substantially as and for the purpose set forth.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

PAUL FLEMMING COX.

Witnesses:
J. L. COX,
W. S. LEONARD.