No. 620,289. Patented Feb. 28, 1899.

A. E. DOWELL.

MEANS FOR FORMING TYPE LINE BARS.

(Application filed Dec. 13, 1898.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

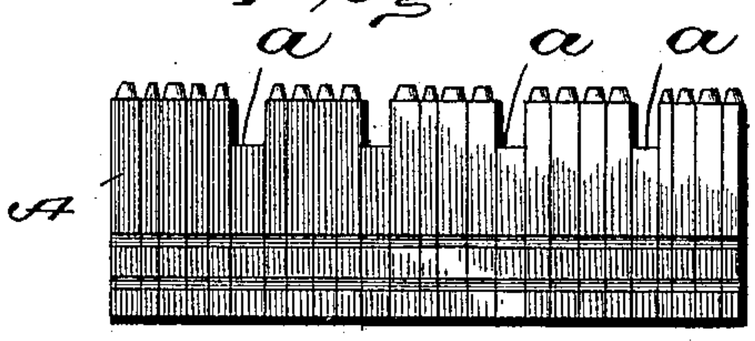

Fig. 2.

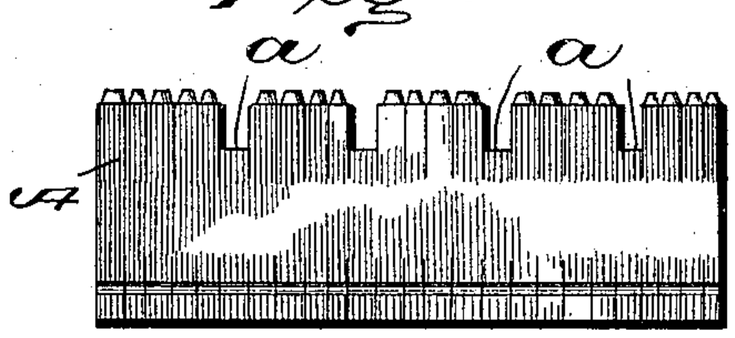

Fig. 3.

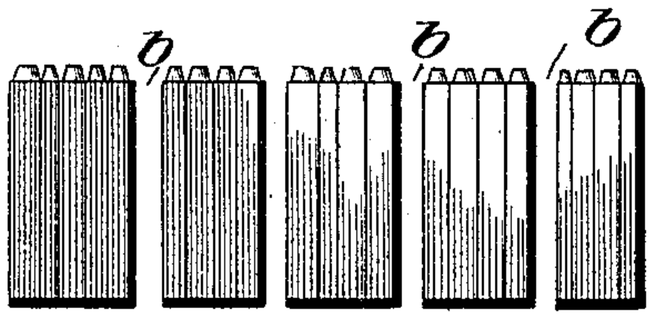

Fig. 4.

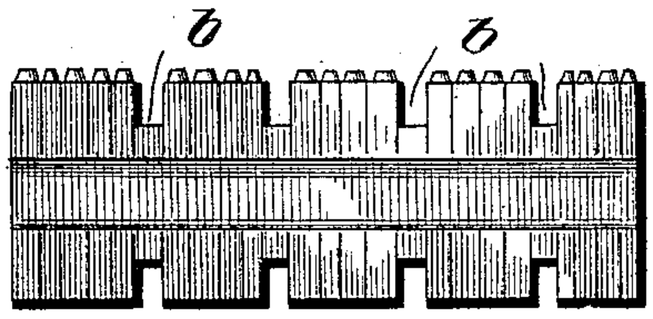

Fig. 5.

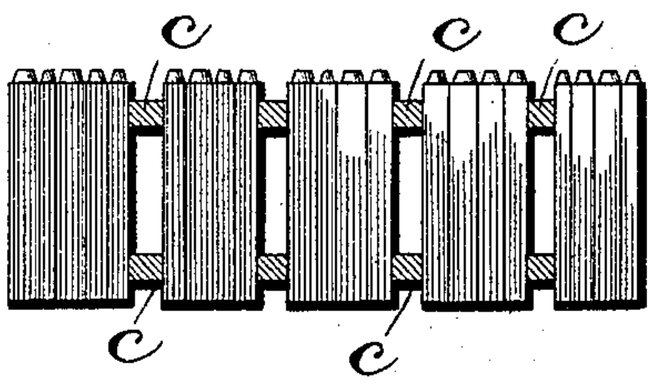

Fig. 6.

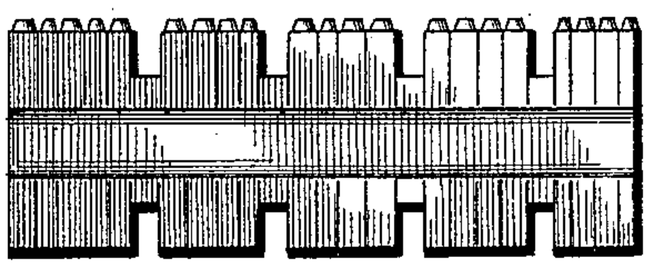

Fig. 7.

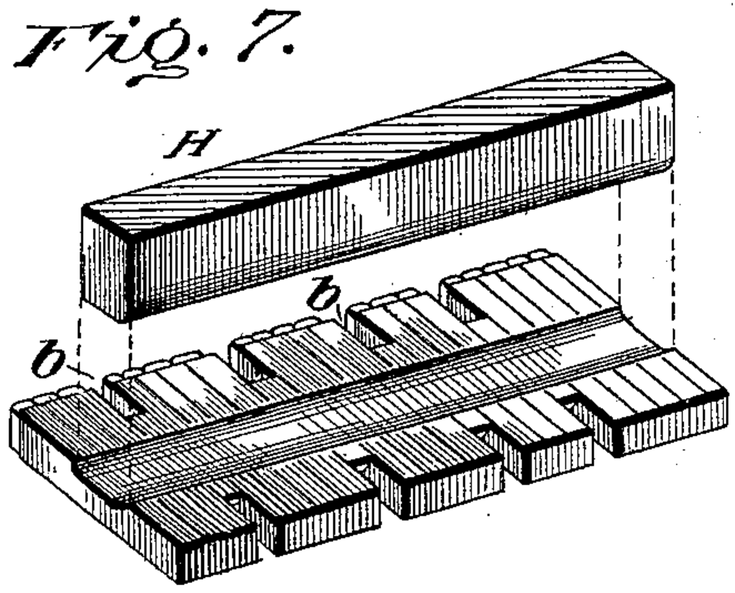

Fig. 8.

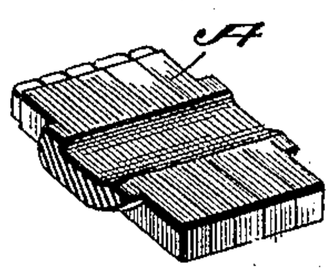

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Fig. 9.

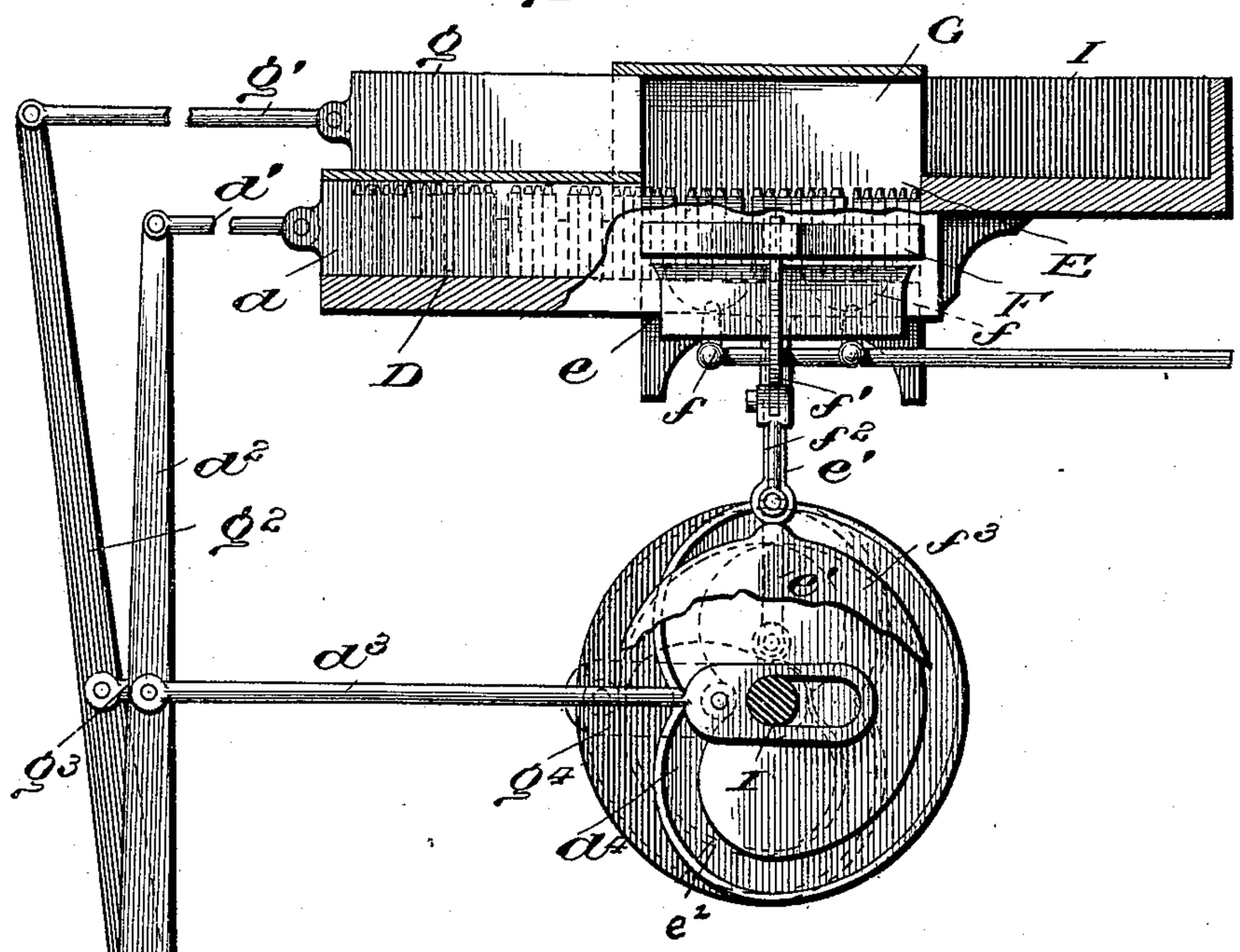


Fig. 10.

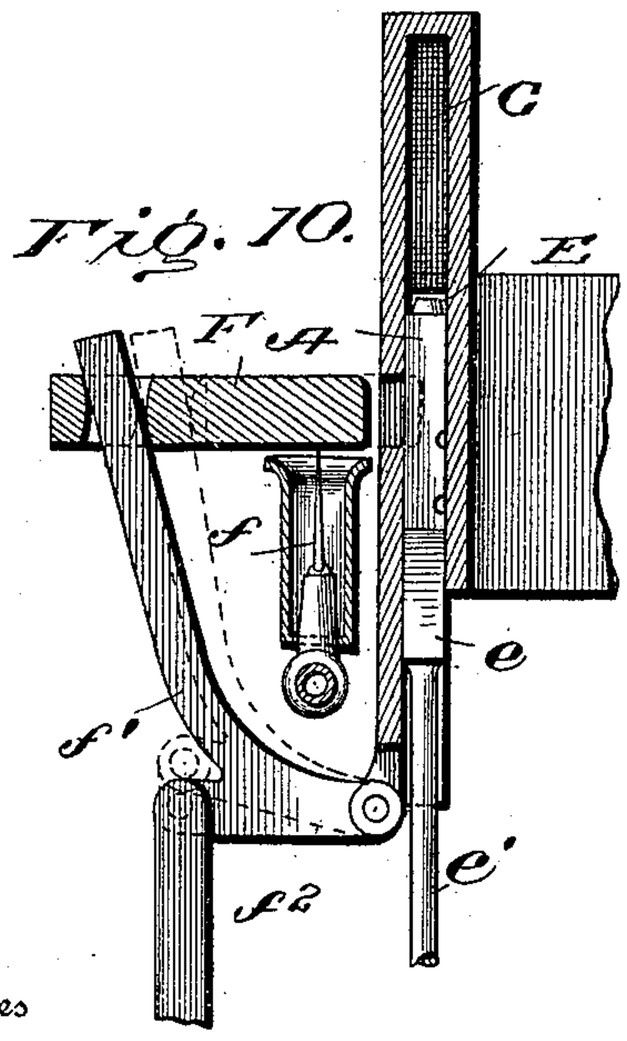
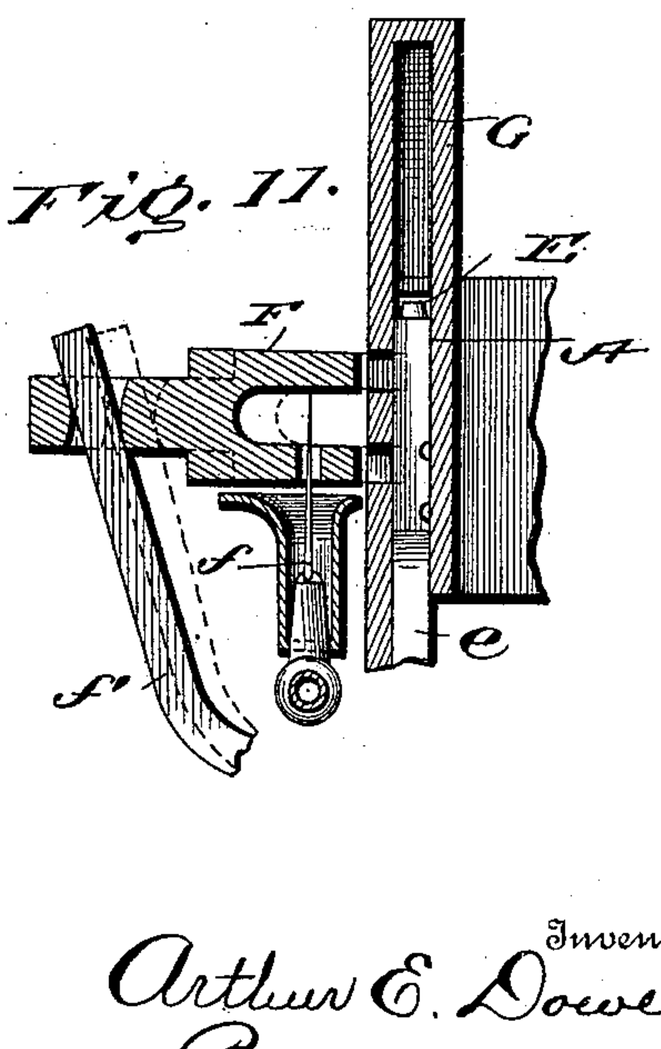


Fig. 11.



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UNITED STATES PATENT OFFICE.

ARTHUR E. DOWELL, OF WASHINGTON, DISTRICT OF COLUMBIA, ASSIGNOR OF ONE-HALF TO JOHN HEWITT, OF CHICAGO, ILLINOIS.

MEANS FOR FORMING TYPE-LINE BARS.

SPECIFICATION forming part of Letters Patent No. 620,289, dated February 28, 1899.

Original application filed June 21, 1898, Serial No. 684,038. Divided and this application filed December 13, 1898. Serial No. 699,131. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR E. DOWELL, of Washington, in the District of Columbia, have invented certain new and useful Improvements in Means for Forming Type-Line Bars; and I hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form part of this specification.

This invention is an improvement in type-setting and linotyping; and its object is to produce a type-bar or line-unit out of a composed line of single type; and it consists in novel means whereby a line of ordinary type (which may be composed by hand or machinery) can be unified or bonded, so that it will virtually form and can be handled as a type-bar. These objects can be attained by my invention without the employment of secondary casting devices or use of auxiliary metal, as the unification or bonding of the line is accomplished by partially melting the type-bodies in the line, so that they become partially homogeneous or unified by the coalescence of the metal, while the individual type characters are preserved and firmly retained in the positions to which they were adjusted prior to the unification of the line. The process or method of making such a type-line bar or so unifying or bonding a line of type and such a novel type-bar form the subject-matter of my original application for Letters Patent filed June 21, 1898, serially numbered 684,038, of which application the present one is a division.

The present invention is best summarized in the claims appended to this specification, and the following description, in connection with the accompanying drawings, forming part of this specification, will enable those skilled in the art to thoroughly comprehend and utilize the invention, and the adaptability of the invention to and its utility in connection with various well-known forms of type casting and composing machinery are so obvious that a detailed description of mechanism for composing the type or for justifying the same is unnecessary.

My invention is applicable to type composed and justified by hand wherever it is desired to unify or bond the composed lines, and it is also applicable to machines in which the lines are composed and justified by machinery, the spaces being supplied during the composition, and such spaces can be made part of the line-bar, if desired, and, as above stated, the invention is also applicable to machines wherein the lines are composed and the words spaced and properly justified by automatic space-bars; but when applied to this class of machines mechanism for inserting the spaces may be omitted and instead the line may be unified while the words are properly separated, as sufficient metal from the type-bodies can be displaced to bridge the intervals between the words and take the place of the spaces proper.

The accompanying drawings show the formation of the type-line bars and a mechanism for making them.

Figure 1 shows a line of ordinary type as set and justified by hand or machinery with ready-made spaces supplied between the words. Fig. 2 is a view of such line unified or bonded. Fig. 3 is a view similar to Fig. 1, the spaces being omitted. Fig. 4 is a view of the line shown in Fig. 3 unified. Fig. 5 is a view similar to Fig. 1, showing a line of type with justifying spacing-bars between the words. Fig. 6 is a view of such line unified. Fig. 7 is a detail perspective view of a line of type and of means for unifying the same. Fig. 8 is a detail sectional view of a unified type-line. Fig. 9 is a sectional elevation of a mechanism for unifying lines of type. Fig. 10 is an enlarged detail transverse section of Fig. 9; and Fig. 11 is a view similar to Fig. 10, showing a slight modification of the heater.

By my method for producing a bonded or unitary type-line, which forms the subject-matter of the original application, a line of ordinary type A is set and justified. Then while so held the line of type is partially melted at a point which will not injure the faces of the type nor destroy the height of the type-bodies, the melted portions of the type-bodies commingling and becoming virtually unitary, so that when cold the previously separate type are bonded together by that portion thereof which has been melted and run to-

gether, and the line can therefore be handled as a unit. This will be obvious from an inspection of Figs. 1 and 2. In Figs. 1 and 2 it will be observed that the line before unification has been composed and justified with the ordinary spaces *a*. In Figs. 3 and 4 the line has been composed and justified by properly separating the words, and while so separated the line has been unified by melting the bodies of the type, as before described, the molten metal partially filling the spaces *b* between the words and taking the place of the ordinary spaces, so that the line becomes unitary and properly justified, as if it had been originally so cast. In Figs. 5 and 6 the line is shown as composed and justified by means of the removable space-bars *c*, such as are used in various forms of linotype or monoline machines, and while so held the line is unified as before with the same result as in Figs. 3 and 4. This unification of a line can be accomplished in various ways within the scope of my invention, care being taken that the type-faces are not injured. For example, the line can be held in a matrix-channel, and while so held a heated iron or bar H may be applied to the side of the line, so as to melt a portion of the side of each type and cause the molten metal to commingle. If the hot iron be pressed sufficiently inward, it will displace some of the molten type-metal and force the same to flow into the spaces *b* between the words. When the lines are simply to be unified, it would be sufficient if the heater only contacts the surface of the type-bodies sufficiently to partially melt them, as in Figs. 1 and 2; but where they are to be unified and intervals between the words to be filled with metal, as in Figs. 3 and 5, the heater-iron should be projected slightly into the type-bodies, so as to slightly displace metal and cause the same to fill the spaces, as in Figs. 4 and 6. Again, a line might be unified by heat applied to the side of the matrix in which the line is held or to the side of the channel through which the line is passed, or the line might be unified while being moved past a heated point.

Obviously when the principle is disclosed many various means of carrying the method into effect and utilizing the invention will suggest themselves or be devised within the scope of my invention.

Fig. 9 shows one form of apparatus which may be utilized to unify lines. The line, properly justified or properly spaced for justification, is fed laterally into a channel D, from which it is moved lineally by a plunger *d* into a channel or holder E, beside which is a heating-iron F. The bottom of this holder E is formed by a vertically-movable plunger *e*, which is raised at the proper time and lifts the unified line of type up to the channel G, leading to the galley I, the unified line being pushed into the galley while plunger *e* is raised by means of the plunger *g*. These plungers may be operated by any suitable arrangement of cams and levers, as indicated in the drawings. The heating-iron may be heated by a gas-jet *f* or in other convenient or preferred manner, and it may be operated by any suitable means. As shown, the plunger *d* is operated by a link d', lever d^2, and a link d^3 from a cam d^4 on a driven shaft T. The plunger *g* is operated by a link g', lever g^2, and link g^3 from a cam g^4. The plunger *e* may be operated by a link e' from a cam e^2, and the heater iron or irons F may be operated by a crank-lever f' and rod f^2 from a cam f^3 on said shaft.

If desired, two or more heating-irons might be used, contacting with opposite sides of the type-bodies or with the same sides thereof at separated or disassociated points, as indicated in Fig. 10.

From the foregoing description and the drawings the invention will be comprehended by those skilled in the art, and its utility and applicability to various forms of machines will be at once recognized.

It will be observed that by utilizing the metal of the type-bodies to form the bond the operation is greatly simplified, and no special formation of type is necessary to enable the unification to take place, and the complicated mechanisms by which auxiliary bodies can be supplied for partial type-bodies or for peculiar-shaped type-bodies to bond the same are avoided.

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

1. In an apparatus for forming type-bars, the combination of means for holding a line of type; with means for partially melting the type-bodies to bond the types together, and form the bar out of the original metal of the type substantially as described.

2. In an apparatus for forming type-bars, the combination of means for holding a line of type; with means for partially melting the type-bodies at a plurality of separate points, so as to bond the types together at a plurality of points, substantially as described.

3. In an apparatus for forming type-bars, the combination of a holder or channel adapted to contain a line of type; with means for partially melting the bodies of the type while confined in such holder to form the bar out of the original metal of the type, for the purpose and substantially as described.

4. In a type-bar-making machine, the combination of a holder or channel to contain a line of type; with a heating device adapted to partially melt the bodies of the type held therein to form the bar out of the original metal of the type, for the purpose and substantially as described.

5. In a type-bar-making machine, the combination of a holder or channel adapted to contain a line of type; with a plurality of heating devices adapted to act upon the line in

said holder so as to partially melt the line at a plurality of points, substantially as described.

6. In a type-bar-making machine, the combination of a holder or channel for containing a line of type, a plurality of heaters at the side of said holder, and means for causing said heaters to simultaneously act upon the line of type and partially melt the type-bodies at a plurality of points, substantially as and for the purpose described.

7. In a type-bar-making machine, the combination of a channel or holder to contain a line of type; with means for moving a line of type therein, means for partially melting the bodies of the type while held in said channel to form the bar out of the original metal of the type, and means for removing the unified line therefrom, substantially as described.

8. In a type-bar-making machine, the combination of a type-line holder, a heating device, means for moving a line of type into said holder and subjecting their bodies to the action of the heating device to convert them into a type-bar out of their own metal, and means for moving the unified lines from the holder, substantially as described.

9. In a type-bar-making machine, the combination of a type-line holder, a movable heater, means for moving a line of type into said holder, means for forcing the heater into contact with the type-bodies to convert them into a type-bar out of their own metal, and means for moving the unified lines from the holder, substantially as described.

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

ARTHUR E. DOWELL.

In presence of—

JAMES R. MANSFIELD,

WILLIAM C. SULLIVAN.