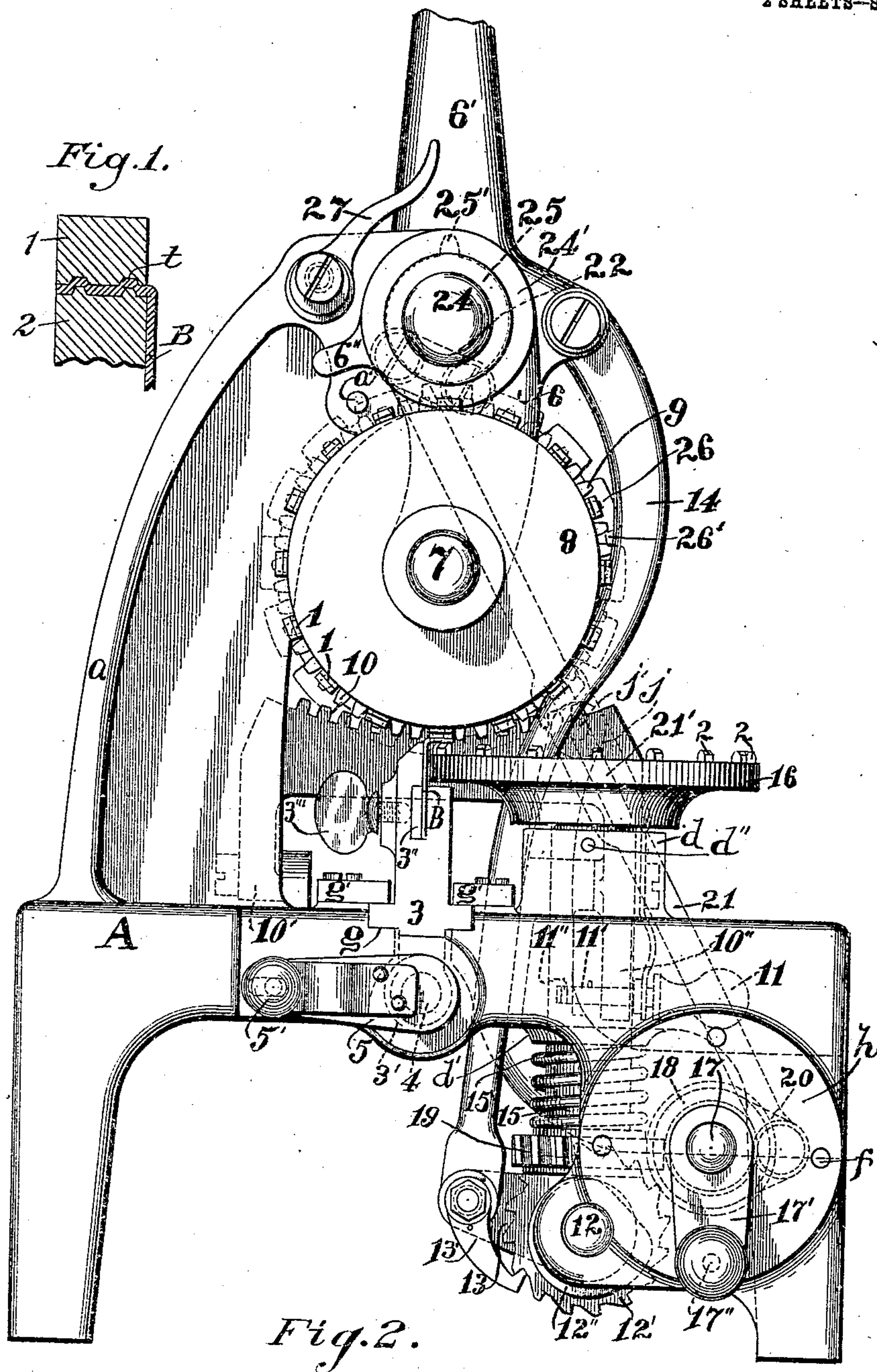


F. H. RICHARDS.
METHOD OF MAKING TYPE AND TYPE BARS.
APPLICATION FILED AUG. 7, 1902.

958,436.

Patented May 17, 1910.

2 SHEETS—SHEET 1.



Witnesses
Fred C. Maynard.
C. H. Kelsey.

Inventor:
F. H. Richards.

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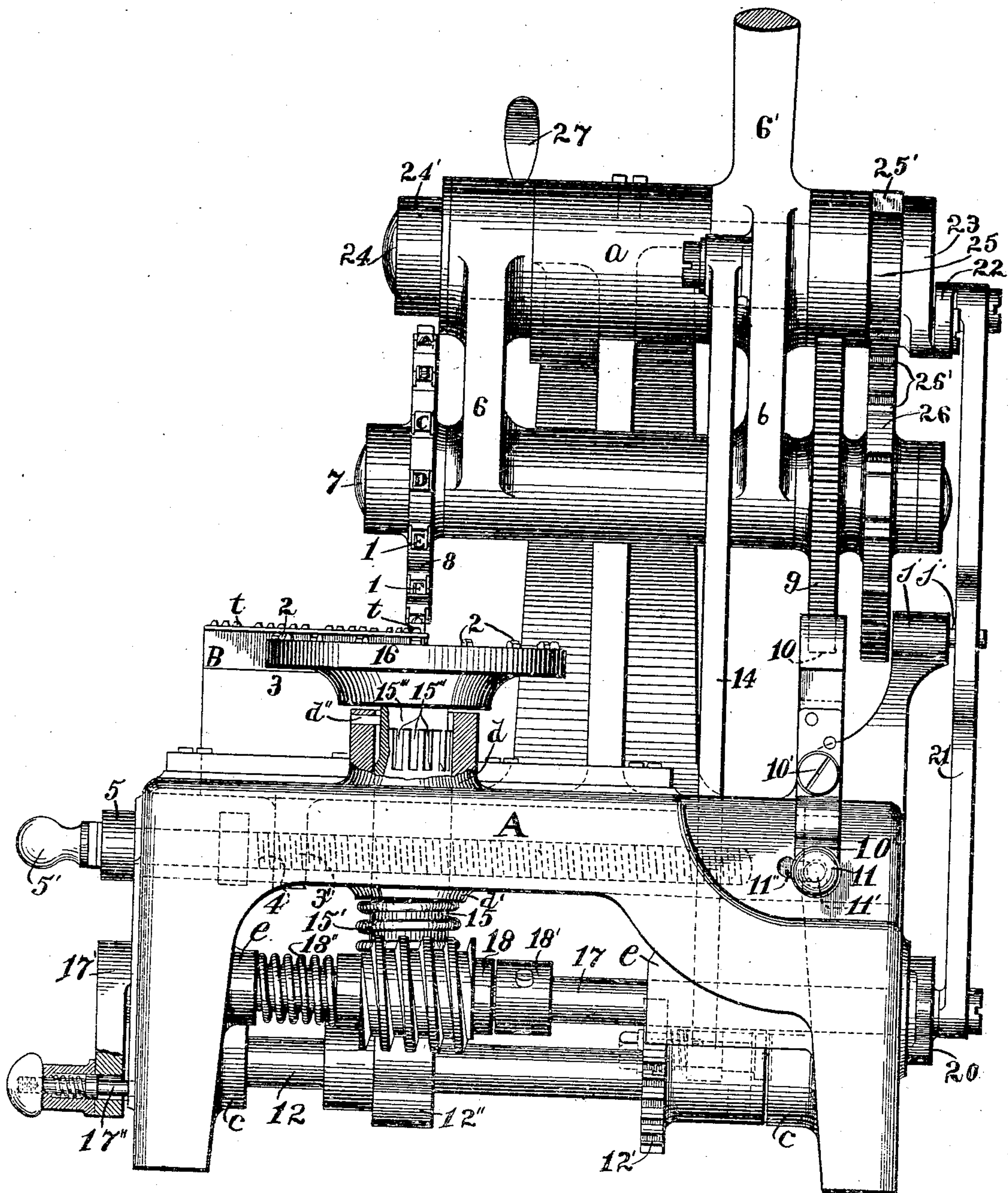


Fig. 3.

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UNITED STATES PATENT OFFICE.

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METHOD OF MAKING TYPE AND TYPE-BARS.

958,436.

Specification of Letters Patent.

Patented May 17, 1910.

Application filed August 7, 1902. Serial No. 118,759.

To all whom it may concern:

Be it known that I, FRANCIS H. RICHARDS, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Methods of Making Types and Type-Bars, of which the following is a specification.

My present invention pertains to the manufacture of impression-faces or characters, and has for its object an improved method of making characters, and more especially printing types, from a blank of proper material, and to the making of a series of such types from or on a blank to form an integral line of types which may constitute the printing portion of a typebar adapted for use in the typographic art.

This invention is particularly adapted in its working to the formation of types from or on relatively thin type-formable material. The latter may be in strips, bars, sheets or plates, and each integral body thereof may be dimensionally adapted to have one or more types or characters formed thereon, and said types or characters may be furnished with bodies which may be integral therewith, and may be adapted for the construction of type-forms. The bodies may be dimensionally sufficient for the purpose mentioned, and may each have a relatively thin flange or member projecting angularly therefrom on which the types may be formed; in which form of typebar provision may be made for supporting the type-bearing flange of one typebar upon the body of a contacting typebar when said bars are in use, and the bodies of such typebars may be of equal thickness throughout, or they may be of reduced thickness in parts, either transversely or longitudinally.

In illustrating a practicable way of carrying out my present invention, I have shown and described herein mechanism adapted to operate upon type-formable material which has been formed into angle-bars, of which one member would ordinarily be wider than the other. Bars of different proportional dimensions may be used.

The operation of molding impressible material in a mold-cavity of a die will, according to my present invention, comprise, in part, a ramming action accompanied by a forging action, which latter may be effected either by a working motion of the mold,

upon the contacting material, or such an action of a rammer; said working motion ordinarily comprising a plurality of movements of one or more of said elements at various angles to the remaining formative element or elements. The working movement may be repeated as often as may be requisite to thoroughly work the impressible material into the angles and interstices of the mold-cavity of a die. The ramming action and the working motion may be combined with pressure suitably applied to one or more of the formative elements during the formative operations thereof. In the present instance I have illustrated and described, as a convenient means for practicing my invention, an organization of mechanism adapted to form types by the cycloidal rocking movements and ramming action of certain elements; provision being made for applying pressure to one or more of said elements in successive gradations, as hereinafter related.

In the mechanisms illustrated herein, I have shown means for pressing a molding die against a surface of suitable material, and of giving to said die a properly regulated cycloidal rocking movement, by which the die will be made to exercise a double function; namely, that of gradually gathering within its mold-cavity a sufficient quantity of the impressed material to fill said cavity completely, and also that of successively forming the gradually-gathered portions of said material; thereby causing the latter to conform with exactitude to said cavity, and thus producing in relief a counterpart of the mold-cavity of the die. While I have chosen the before-mentioned cycloidal movement for illustration herein, I do not, however, limit myself to the specific use thereof; nor do I limit myself to the particular direction in which said character-formative movement may be made.

Where the thickness of the impressible material permits the pressure to be applied and the working or formative movements to be continued to the necessary extent, they will suffice to produce a perfect design in relief; but in order to effect such a conformation of relatively thin material in accordance with my present invention, I may use ramming members such as the rammers or counter-punches shown herein. These may engage the impressible material at points opposite to those at which the dies operate,

and they may be severally adapted in form and dimensions to coöperate with the respective dies by acting as rigid counters or backing for said relatively thin impressible material, which will thereby be rammed into the interstices of the mold-cavity of the die with greater force and, correspondingly, with more accurate results than would be obtained if the material were not thus reinforced.

Figure 1 of the drawings is a vertical transverse section of parts of a typebar, a die and a rammer or counterpunch, respectively, and illustrates the relative positions of said elements when they are alined, as at the median position attained in the rocking movement; Figs. 2 and 3, respectively, are left end and front elevations of a machine adapted to be used in forming type-bars from blanks.

Reference marks are relatively alike through the drawings.

In the drawings which accompany this specification, I have illustrated mechanism typical of practical and operative devices for making types and integral lines of types according to my present invention, but in so illustrating the specific mechanical details and organizations thereof shown it should be understood that various other forms of mechanism may be used for accomplishing the results attained by the operation of any conventional forms of devices shown; as, in general, a practically operative machine for producing type after type will embody refinements and additional features, which, for the reason that these refinements and additional features specifically are not deemed to be essential to the production of types according to my present invention, are not shown herein.

Although the present invention is applicable to the production of characters, designs, die-faces, types, etc., I contemplate more especially its application to the making of raised characters or characters in relief on a face of a proper blank, that is, to the making of types; and while it will therefore be set forth more particularly herein as applied to such a purpose, it will be understood that it is not limited to the production of types alone.

According to the method set forth herein of making types and lines of types, the type, at each type-making operation, is formed as the result of repeated actions to which it is subjected; and by reason of these successive and repeated actions, the stock is worked and wrought to fully, and it might be said absolutely, fill the finest interstices and indentations, however fine they may be, within the mold-cavity of the die. The natural result of the repeated forging, swaging and ramming pressures, (well known to those familiar with processes of working and forg-

ing metal,) is the condensing of the stock and the finishing of the impression face and other surfaces of the type to a high degree of smoothness and uniformity of texture.

Referring now more in detail to the form of mechanism for making types and lines of types, as set forth in the drawings accompanying the present specification, it will be understood from what has already been stated, that the mechanism herein illustrated is not wholly the preferred form thereof for practicing the present improvements, since in a complete operative mechanism for making determinate and closely related types in succession, a selective apparatus will usually be embodied, whereby upon the selection of a particular die and its correlative punch the corresponding type will be automatically made upon the proper face of the blank and under the control of an operator.

The various devices shown herein illustrate means for accomplishing various subsidiary movements, and especially the cycloidal rocking movement and the impressing movement hereinbefore mentioned as illustrating a form of my present invention.

Referring now to the drawings, a blank angle-bar B, is shown inserted in a sliding work-holder 3, provided with clamping means, shown as a gib 3'', and thumb-screws 3''', 3''', by which the bar B, may be secured in the holder. Gibs g', g', secured to the base A, by screws, serve to retain the holder 3, in a groove g, formed in the base A. A screw-threaded nut 3', fixed on the holder 3, projects downward through a slot in the base A, for engaging a screw-threaded shaft 4, constituting a feed which is journaled in suitable bearings secured to the base A, and will be rotated by means of a crank 5. The crank-handle 5', embodies a spring-pressed bolt which engages in a recess formed in the base A, and thus prevents the crank 5, from being accidentally moved. The pitch of the thread of the feed-screw 4, bears a definite relation to a linear unit of type measurement; as, for instance, to a "point", technically so-called; and the several types formable by the machine, will, in their respective transverse dimension lengthwise of a line of said types respectively equal multiples of said unit. The term "type", as used herein, is intended to apply to the printing face of an impression device, and to also include in the transverse dimensions thereof due proportions of the spaces between said face and the adjacent faces and the faces in adjacent lines of so-called "solid matter". Therefore, the elements mentioned will be so definitely proportioned one to the other that by means of the feed-screw 4, a bar B, will be definitely and accurately moved to receive consecutive and properly spaced impressions from the impressing members herein shown as dies 1, 1.

A suitable shaft 24 is shown journaled in a bracket *a*, integral with the base A, which shaft is utilized as a pivot for a rocking-frame 6. Journaled in said rocking-frame 5 is shown a rotatable shaft 7, on which is mounted a mold-holder, herein termed a die-carrier, rotatable with the shaft 7, and shown as a disk 8, with radiating intaglio or molding dies 1, 1, rigidly mounted on its 10 periphery. A lever 6' is mounted upon the rocking-frame 6, and by means thereof the die-carrier 8, may be rocked transversely of the typebar-holder 3. A stop-member which has an arm 6'', is fixed upon a hub of the 15 rocking-frame 6, and a fixed stop herein shown as a stud *a'*, and a pivoted adjusting stop 27 are shown attached to the bracket *a*, and positioned to limit the movement of the stop-member 6'', and thereby to limit the 20 rocking movement of the frame 6, and die-carrier 8. Mounted on the shaft 7, is also shown a spur gear-wheel 9, adapted to mesh with a curved rack or internally toothed gear-segment 10, the ends of which are pivoted, as at 10', 10', to permit the gear-segment 10, to be rocked transversely of the 25 gear-wheel 9; an arm 10''; being shown as fixed upon the gear-segment 10, for the purpose mentioned. A handle 11, may be attached to the arm 10'', and embodies a spring-pressed bolt 11', for engaging endwise in either of two holes 11'', (one only being shown,) formed in the base A, and severally adapted to receive the bolt end. 35 The pitch of the gear-wheel 9, may preferably be an exact divisor of that of the die-carrier 8, the latter being considered as a toothed wheel on which the dies 1, 1, may be supposed to occupy the positions of teeth. 40 Assuming now that a die 1, be brought to the proper impressing position, and the spring-pressed bolt 11', be engaged as shown in the drawing, the gear-wheel 9, will so engage the gear-segment 10, as to first precisionize, if necessary, the operative die, and thereafter to properly locate transversely of 45 the typebar any type-formative movements that may be made by said die. The type-formative pressure that coacts with the working movements of the molding die to form types may be applied in gradations varying at each successive movement of said die; said gradations being properly adapted to cause the mold-cavity of the die to gather, 50 at each of said movements, such a portion of the type-formable material as it may, at the time, be capable of molding into a shape which is particularly adapted to forward the type-forming process. In the mechanism 60 illustrated herein, a cam 12'', is shown as a member which may be operated for the purpose mentioned.

A rotatable shaft 12, is journaled in bearings *c*, *c*, in the base A. A ratchet-wheel 12', 65 mounted upon and adapted to rotate the

shaft 12, is engaged by a spring-pressed pawl 13', which is pivoted on an arm 13, mounted to rock on the shaft 12. A link 14, is also shown pivoted to the arm 13, and to the rocking-frame 6. The cam 12'', is 70 mounted upon and rotates with the shaft 12. A vertical rotatable shaft 15, is shown, journaled in a bearing *d*, which may be integral with the base A. Mounted upon one end of the shaft 15, is shown a member herein 75 termed a punch-carrier 16, in the form of a disk which projects into the angle of a bar B, in the work-holder 3, and the other end of said shaft abuts against the periphery of the cam 12''. 80

Mounted on and axially of the punch-carrier 16, are shown rammers or counter-punches 2, 2, which may be equal in number to the dies 1, 1, and be severally correlated to and adapted to coact with the mold-cavities of the respective dies to form types or 85 other characters. For some purposes however, as, for instance, where the dies have similar mold-cavities, a single ramming-punch may be used with a plurality of dies. 90 Assuming now that a correlative ramming-punch has been suitably positioned (as hereinafter related,) to coact with an operative molding die in forming a type *t*, on the particular bar B, which may be in position in 95 the typebar-holder, and that the lever 6', be operated for the purpose before-mentioned; then, at each downward movement of the lever 6', the pawl 13', will engage a tooth of the ratchet-wheel 12', and at each returning or upward movement of the lever 6', the 100 pawl 13', will partly rotate the shaft 12, and cam 12''. The periphery of the cam 12'', being suitably formed for the purpose, the several partial rotations of the latter will 105 cause it to move the shaft 15, punch-carrier 16, and ramming-punch 2, toward the operative die 1, and by means of the operative punch 2, to ram the interposed material of the bar B, into the particular type-forming 110 member or die 1, which may then be operating on the bar B. This driving process will be accomplished intermittently, and at each step thereof each working movement of the die may cause the latter to gather in its 115 mold-cavity such a portion of the type-formable material as it may, during the particular movements, be capable of molding, as before-mentioned. The cam 12'', as shown, is of such a form that when it has been rotated until its longest radius has passed the 120 axis of the shaft 15, it will permit the latter with the parts mounted thereon to be suddenly returned to their first positions; said return being effected in this instance by 125 means of a helical spring 15', shown herein as encircling the shaft 15, and engaging at one end a member which is secured to said shaft, and at the other end a boss *d'*, which forms a part of the bearing *d*. The operat- 130

ing die may now be withdrawn from the formed type; the gear-segment 10, may be unmeshed from the gear-wheel 9, and the die-carrier 8, may be rotated to bring another die 2, into position to form a type.

Journalled in bearings *e, e*, is shown a shaft 17, which may be rotated by means of a crank 17', the handle of which may embody a spring-pressed indexing bolt 17'', which may engage in any of a number of holes *f, f*, formed in a graduated index circle concentrically of the shaft 17, on a disk *h*, which may be integral with the base A. Slidably splined on the shaft 17, is shown a worm-threaded sleeve 18, which may be urged toward a stop-collar 18', by a helical spring 18'', which encircles the shaft and impinges against the sleeve 18, and against a boss which forms part of a bearing *e*. The worm-threaded sleeve 18, may engage a worm-wheel 19, which is fixed upon and may rotate the shaft 15. In the boss *d*, is shown a guide-pin *d''*, which may engage in recesses 15'', 15'', which are formed in the shaft 15, and may be equal in number to the ramming-punches 2, 2, on the punch-carrier 16. The shaft 15, may be reduced in diameter as at 15''', near the hub of the punch-carrier 16, sufficiently to let it rotate freely when the reduced portion 15''', is on a plane with the guide-pin *d''*. Assuming now that a punch 2, be brought to a ramming position relative to the bar B, by rotating the punch-carrier 16, and that the latter, with the shaft 15, be moved toward the die-carrier 8; then, the guide-pin *d''*, will enter a recess 15'', and guide the shaft 15, in an axial direction, thereby directing the operative punch 2, toward the normal operative positions thereof. By my present invention, provision is made for permitting the worm-threaded sleeve 18, to move axially of the shaft 17, in order to accommodate itself to any movement thereof which may be caused by the axial movement of the worm-wheel 19. In the organization shown herein, the spring 18'', may yield sufficiently to allow an axial movement of the threaded sleeve 18, when the latter is urged in said direction by an axial movement of the spiral teeth of the worm-wheel 19, engaging with the worm-thread on said sleeve. In the mechanism shown herein, a clockwise rotation of the crank 17', will cause the sleeve 18, to be urged toward and against the collar 18', by the action of the parts mentioned. Should the crank 17', be rotated in the opposite direction, the spring 18'', may retain the parts mentioned in contact with each other. When the sleeve 18, abuts against the collar 18', rotation of the former will cause the rotation of the shaft 15, and of the members mounted thereon.

Provision may be made, for insuring the synchronous rotation of the die-carrier 8,

and the punch-carrier 16. In the organization shown herein, there is mounted on the shaft 17, a crank 20, which is pivoted to one end of a connecting-rod 21, which is slotted lengthwise as at 21', where it may be engaged by and rock on a fulcrum-pivot *j'*, fixed in a bracket *j*, which may be integral with the base A. At its other end the connecting-rod 21, is pivotally connected to a link 22, which is also pivotally connected with a crank 23, which is mounted on an end of the shaft 24, on which are secured collars 24', 25, to prevent end play of said shaft. A tooth 25', projects radially from the collar 25, and may engage with notches 26', 26', which are shown as formed in a disk 26, and equal in number to the dies 1, 1. The disk 26, is mounted on the shaft 7. The bolt 17'' being disengaged from the index disk *h*, the crank 17', may be operated as before-mentioned to rotate the shaft 17, and, with the latter, the crank 20, by means of which the connecting-rod 21, may be so operated as to cause the link 22, to rotate the crank 23, and the shaft 24. At each rotation of the latter, the tooth 25', of the collar 25, may engage in a notch 26', of the disk 26, and thus partially rotate the latter. The correlation of the members which may be operated by the crank 17', may be such that each rotation of the latter will effect an equal angular movement of the punch-carrier 16, and the die-carrier 8, and by means thereof all of the dies 1, 1, and punches 2, 2, may be correlatively presented at their respective type-forming positions, and the engagement of the indexing-bolt 17'', in a particular hole *f*, in the index-disk *h*, will denote and insure the type-forming positioning of the indicated molding-die and of the correlative ramming-punch.

Having described my invention, I claim—

1. That improvement in the art of making a character which consists in simultaneously subjecting the blank upon which the character is to be formed to ramming treatment between opposed dies and to a repeated forging movement.

2. That improvement in the art of making a character which consists in simultaneously subjecting the blank upon which the character is to be formed to ramming treatment between opposed dies and to a repeated forging movement applied transversely of the line joining the character-field of the forming character with the character-field of the adjacent character.

3. That improvement in the art of making a character which consists in simultaneously subjecting the blank upon which the character is to be formed to ramming treatment between opposed dies and to a repeated forging movement applied at various angles to the blank.

4. That improvement in the art of making

a type which consists in simultaneously subjecting the blank upon which the type is to be made to ramming treatment between opposed dies and to a repeated forging movement.

5. That improvement in the art of making a type which consists in simultaneously subjecting the blank upon which the type is to be made to ramming treatment between opposed dies and to a repeated working movement applied transversely of the line joining the character-field of the forming type with the character-field of an adjacent type.

6. That improvement in the art of making a character which consists in simultaneously subjecting the blank upon which the character is to be formed to ramming treatment between opposed dies and to a repeated forging treatment applied transversely of the line joining the character-field of the forming character to the character-field of an adjacent character.

7. That improvement in the art of making a character which consists in simultaneously subjecting the blank upon which the character is to be formed to ramming treatment between opposed dies and to repeated swaging treatment by one of said dies.

8. That improvement in the art of making a character which consists in simultaneously subjecting the blank upon which the character is to be formed to ramming treatment between opposed dies and to a repeated swaging treatment applied transversely of the line joining the character-field of the forming character with the character-field of an adjacent character.

9. That improvement in the art of making a character which consists in simultaneously subjecting the blank upon which the character is to be formed to ramming treatment between opposed dies and to a repeated forging and swaging treatment by one of said dies.

10. That improvement in the art of making a character which consists in simultaneously subjecting the blank upon which the character is to be formed to ramming treatment between opposed dies and to a repeated forging and swaging treatment applied transversely of the line joining the character-field of the forming character to the character-field of an adjacent character.

11. That improvement in the art of forming a character which consists in simultaneously subjecting the respective sides of a blank upon which a character is to be made to a ramming treatment and to a die treatment, and during the said treatment imparting a relative subsidiary movement to the die and of gradually and progressively forming a character by successive and repeated shapings.

12. That improvement in the art of forming a line of type which consists in individually

subjecting successive portions of a blank at the respective sides thereof to a ramming treatment and to the contemporaneous action of opposed dies severally operative to gradually and progressively form type at successive points along the line of the blank.

13. That improvement in the art of forming a line of type which consists in subjecting both sides of each of the successive portions of a blank individually to a ramming treatment and to the repeated treatment of an opposed die, the ramming treatment and the repeated die treatment being applied simultaneously at each of the successive points along the length of the blank.

14. That improvement in the art of forming a line of type which consists in subjecting successive portions of a blank individually to treatment, namely; applying the proper pairs of opposed dies successively at successive points along the line of the blank and during the application of each pair of dies imparting to the members a ramming treatment and a relatively subsidiary movement, the ramming treatment and the successive application of the dies being simultaneous at successive points along both sides of the line of the blank.

15. That improvement in the art of making a line of type which consists in simultaneously subjecting the material of both sides of the blank to a repeated ramming treatment and to a repeated die action of selective pairs of type-making instrumentalities, selectively brought into operative positions.

16. That improvement in the art of forming a line of type which consists in subjecting successive portions of a blank individually to a ramming treatment and a die treatment by applying the proper pair of dies successively at each of the successive points along the line of the blank, the successive applications of the dies being simultaneous on both sides each of the successive points along the line of the blank.

17. That improvement in the art of making a line of type which consists in simultaneously subjecting the material of both sides of the blank to a ramming treatment and a die treatment through the action of selective pairs of type-making instrumentalities selectively brought into operative positions.

18. That improvement in the art of making characters which consists in simultaneously subjecting the blank upon which the character is to be formed to the action of opposed die faces, and to a repeated forging movement.

19. That improvement in the art of making a character which consists in simultaneously subjecting the blank upon which the character is to be formed to a ramming action of the opposed faces of a pair of dies

and to a repeated movement applied at various angles to the blank.

20. That improvement in the art of making a type which consists in simultaneously
5 subjecting the blank upon which the type is to be formed to the ramming treatment of dies having opposed faces and to a repeated forging movement.

21. That improvement in the art of making
10 a type consisting in subjecting the blank upon which the type is to be formed to the ramming treatment of dies having opposed contradistinctive faces and to a repeated forging movement.

15 22. That improvement in the art of mak-

ing type which consists in subjecting the blank to the conjoint action of opposed dies having contradistinctive faces and simultaneously to a repeating forging action.

23. That improvement in the art of mak- 20
ing a type upon a blank which consists in subjecting the same to the action of opposed die faces and producing repeated relative movements between these during the die action.

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