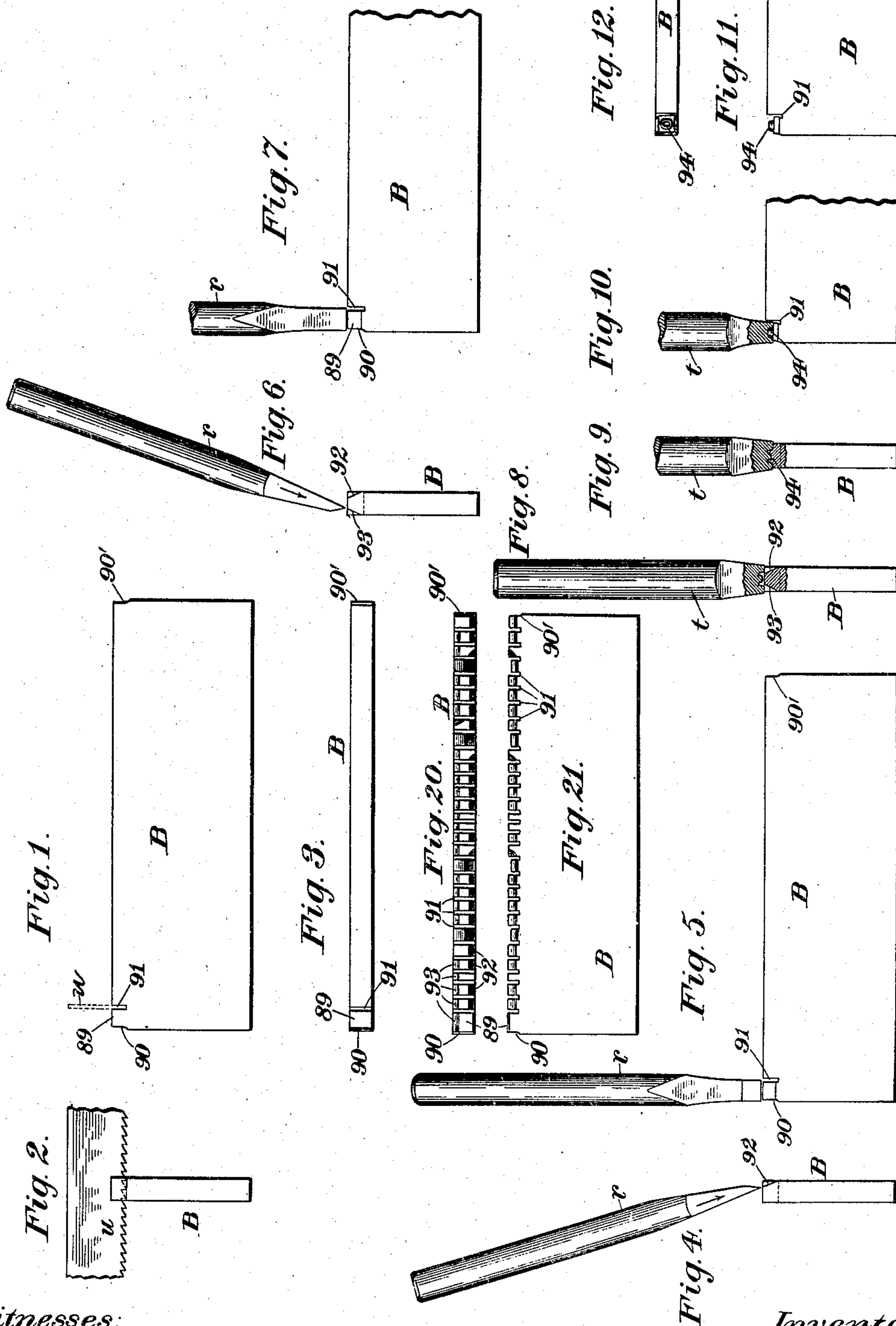


D. W. DODSON.  
ART OF MAKING CHARACTER BARS.  
APPLICATION FILED JULY 22, 1896.

911,955.

Patented Feb. 9, 1909.

4 SHEETS—SHEET 1.



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4 SHEETS—SHEET 2.

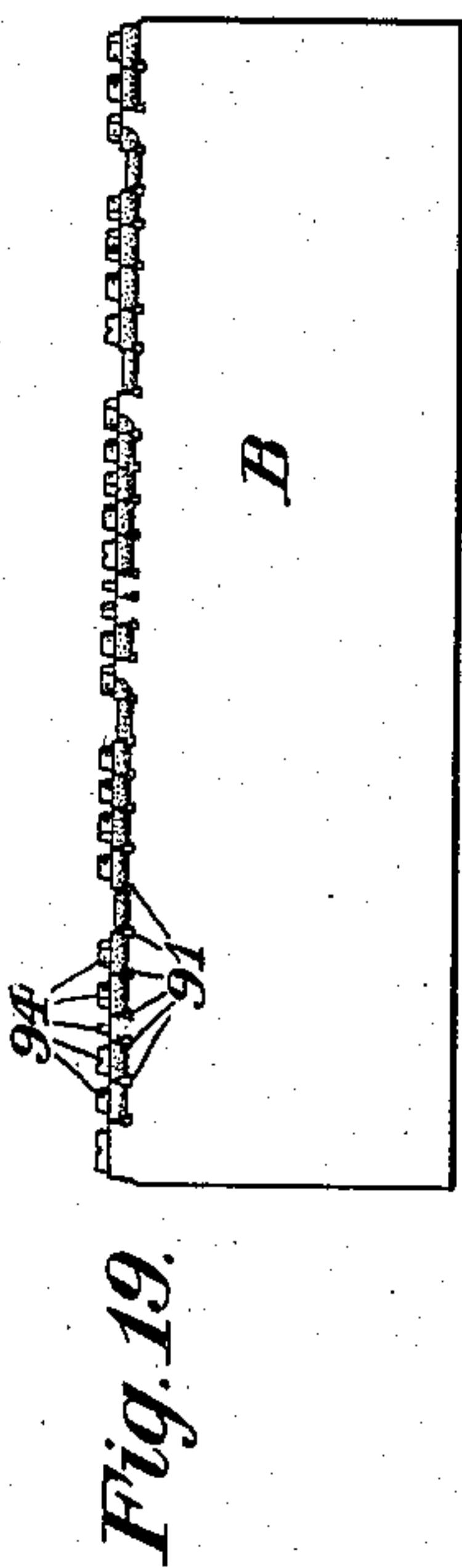


Fig. 13.

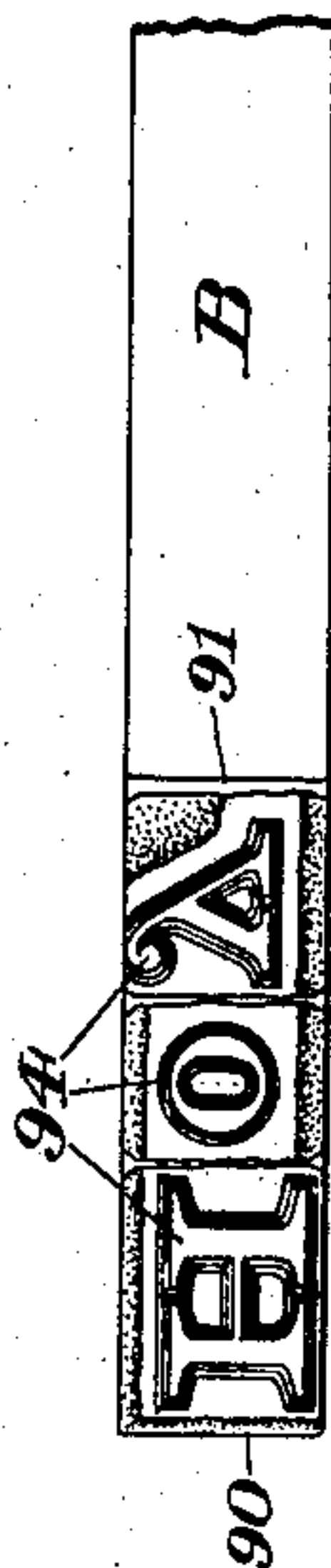


Fig. 15.

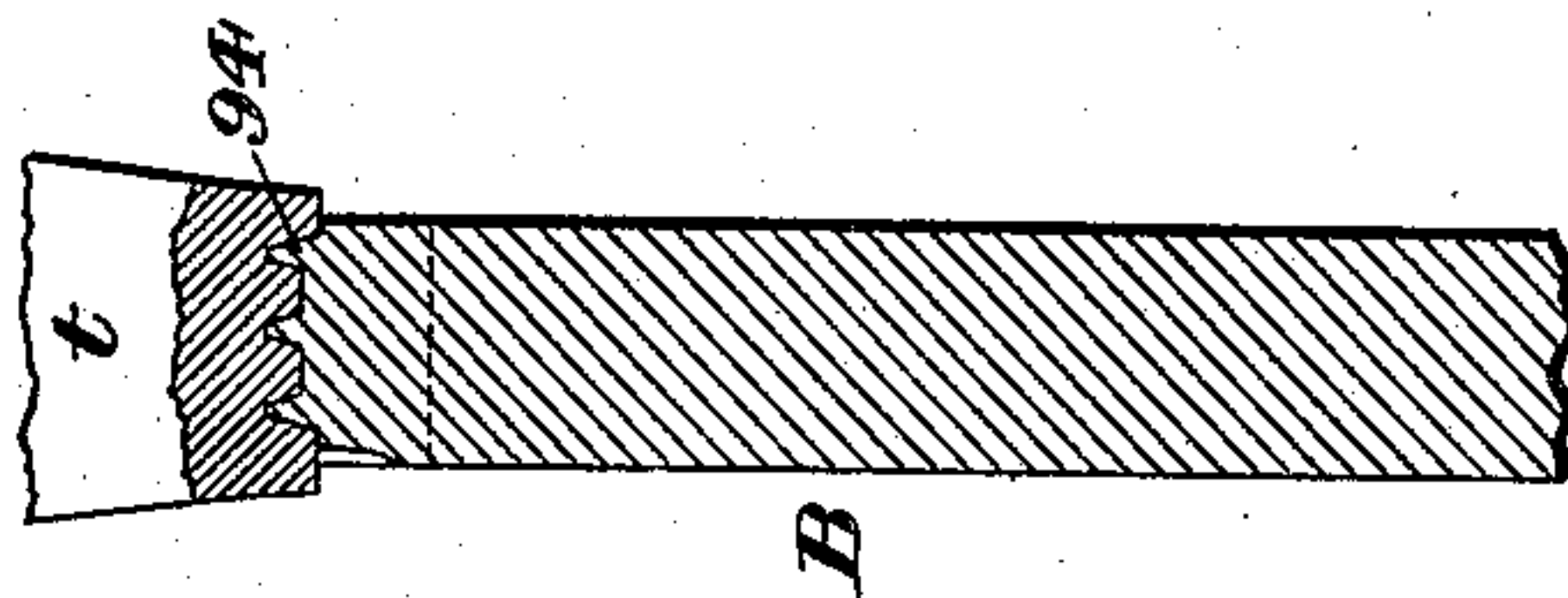


Fig. 16.

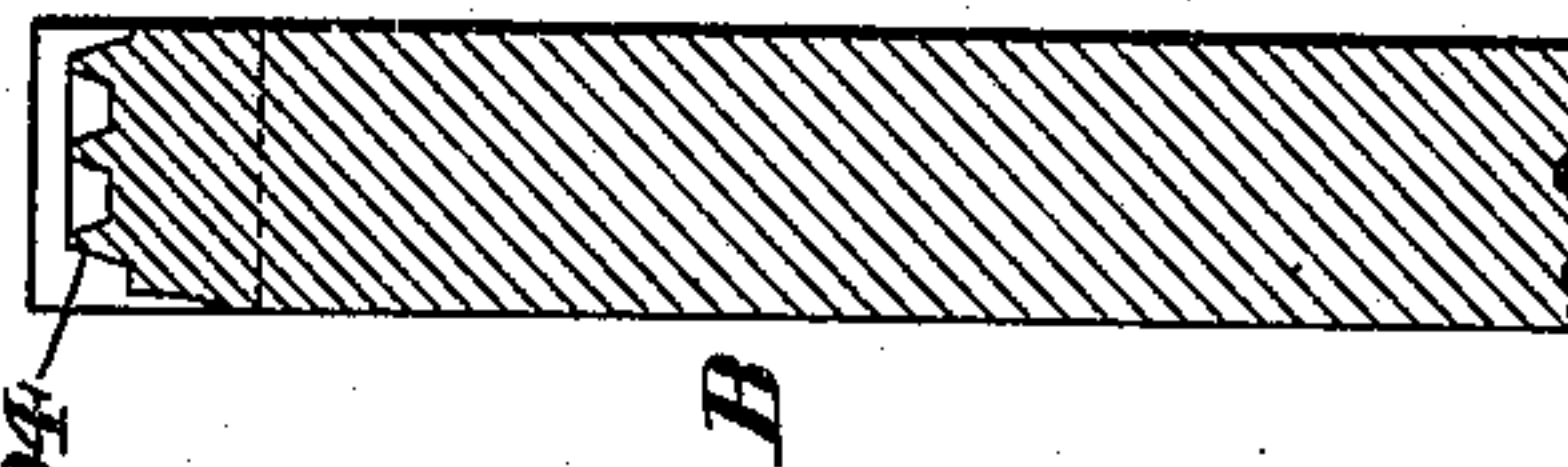


Fig. 17.

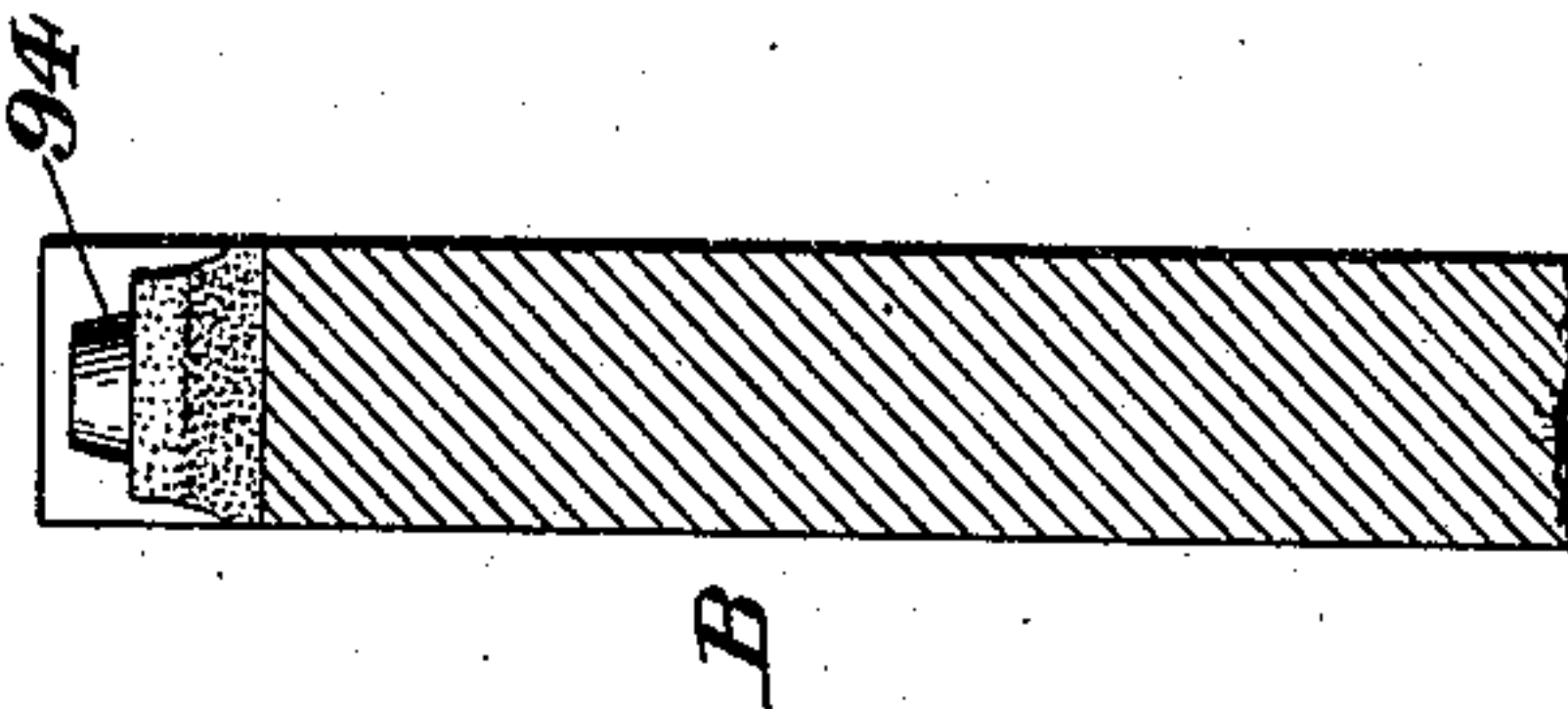
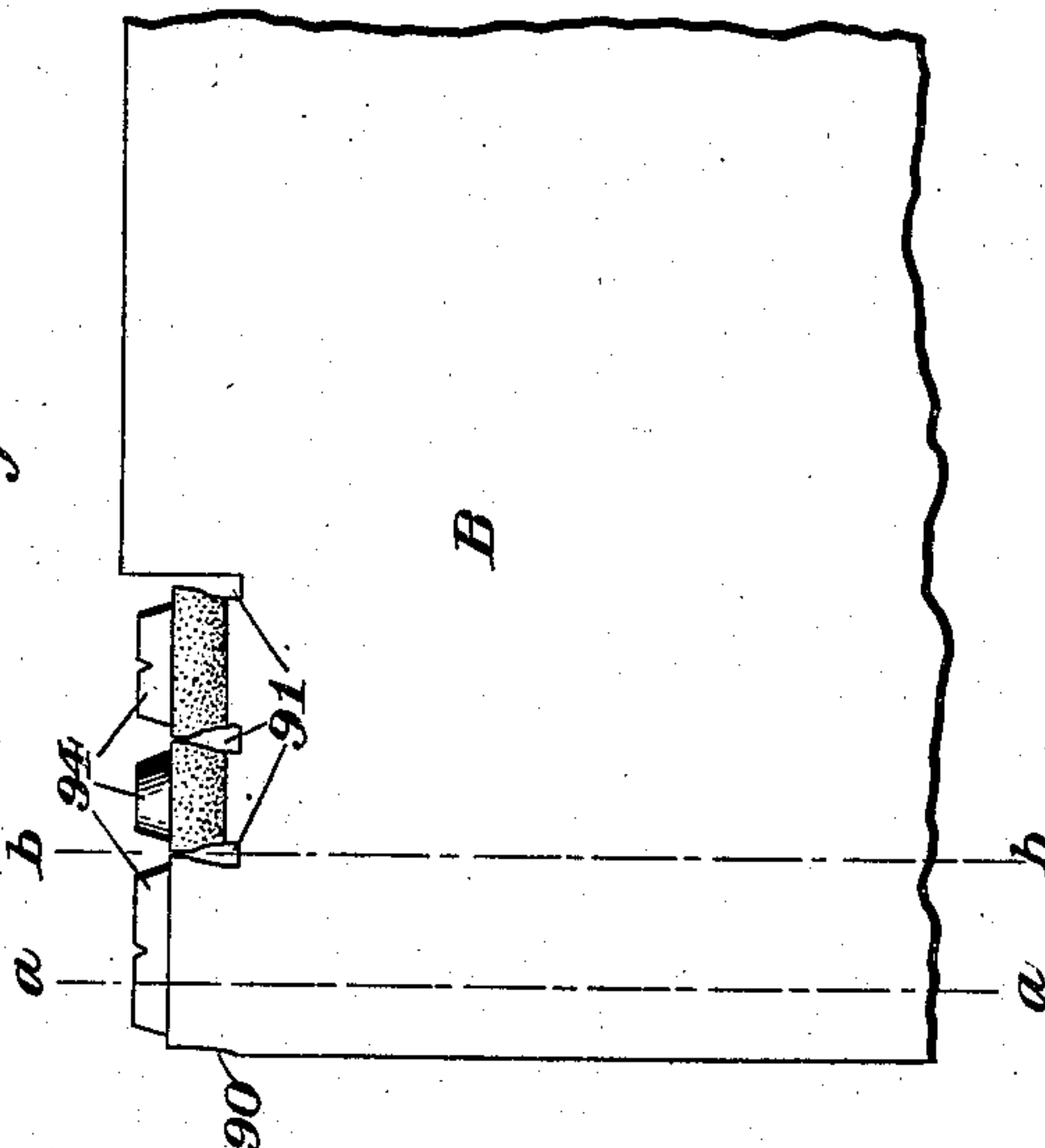


Fig. 14.



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4 SHEETS—SHEET 3.

Fig. 23.

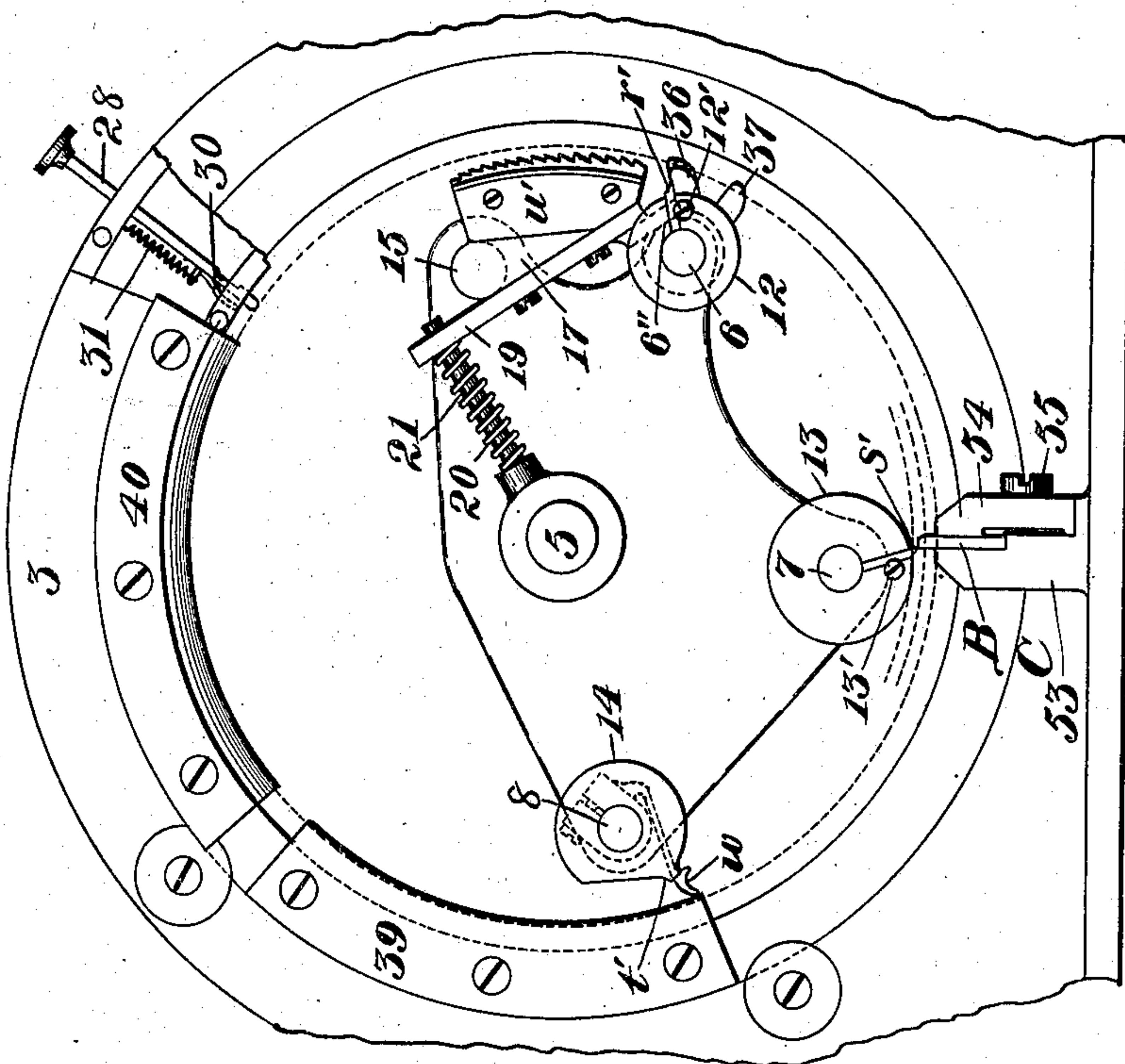
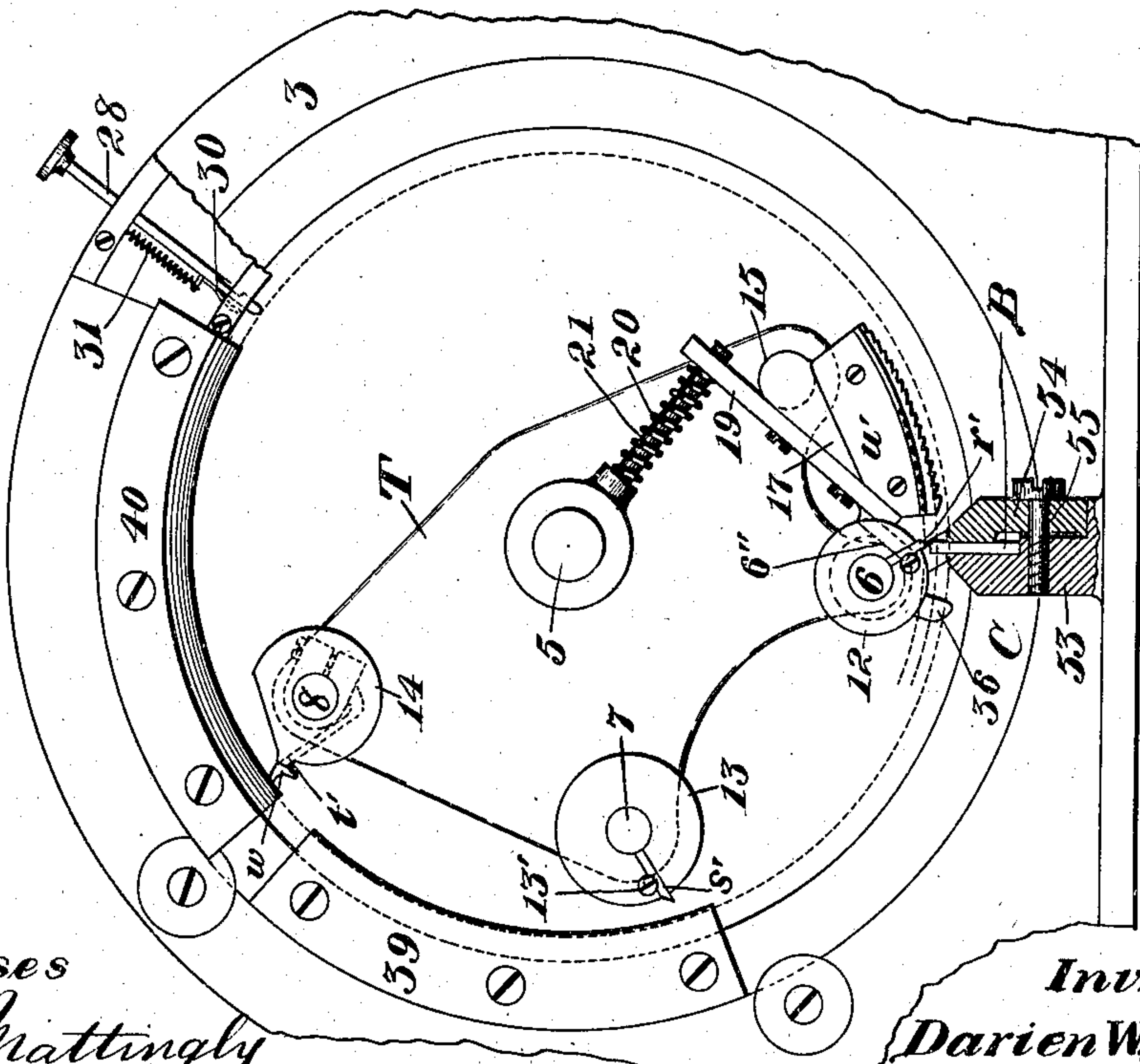


Fig. 22.



Witnesses

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4 SHEETS—SHEET 4.

Fig. 25.

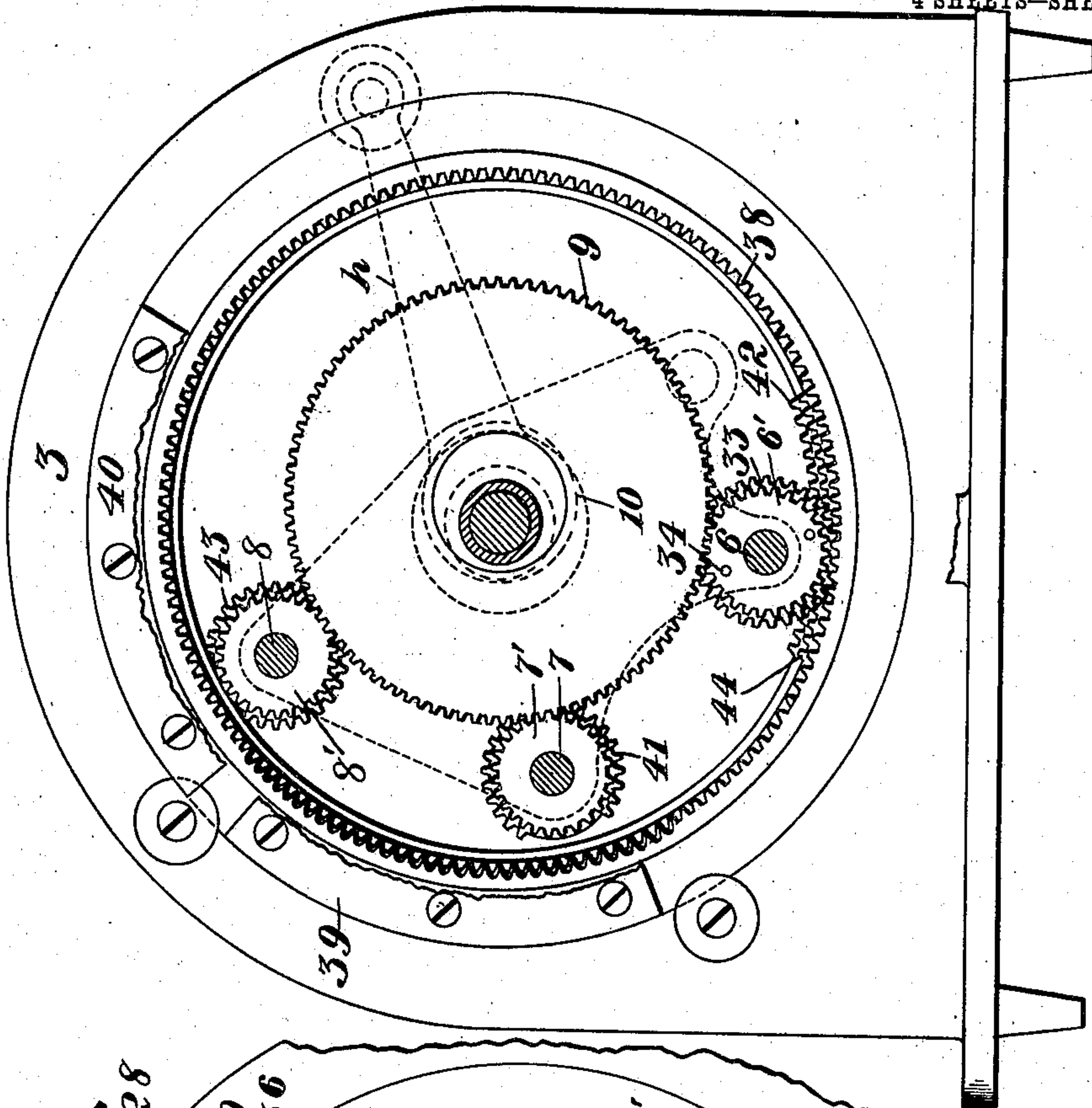
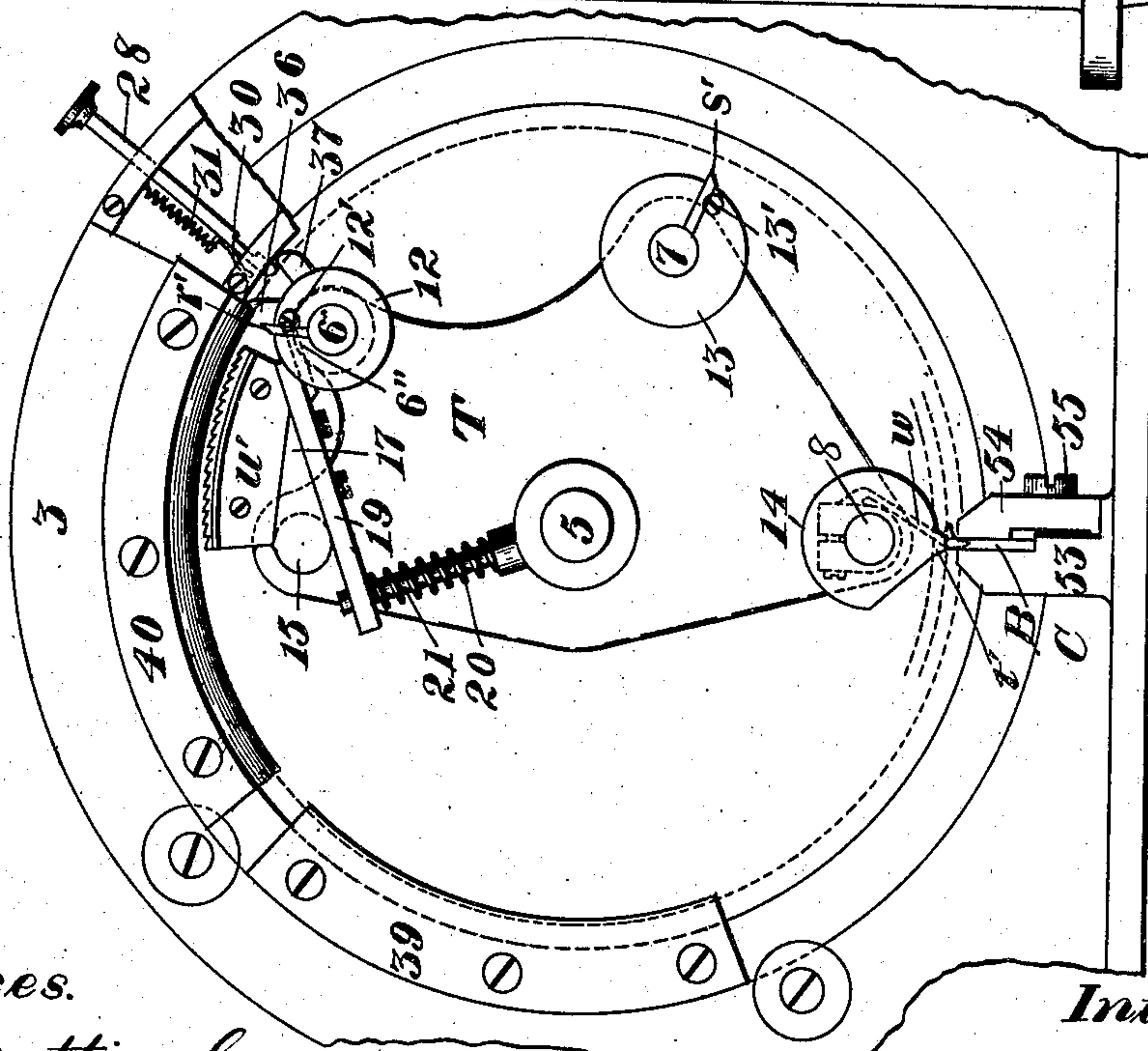


Fig. 24



Witnesses.

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*F. H. Richards.*



# UNITED STATES PATENT OFFICE.

DARIEN W. DODSON, OF HARTFORD, CONNECTICUT, ASSIGNOR TO THE AMERICAN TYPE-BAR MACHINE COMPANY, A CORPORATION OF WEST VIRGINIA.

## ART OF MAKING CHARACTER-BARS.

No. 911,955.

Specification of Letters Patent.

Patented Feb. 9, 1909.

Application filed July 22, 1896. Serial No. 600,152.

*To all whom it may concern:*

Be it known that I, DARIEN W. DODSON, a citizen of the United States, residing in Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in the Art of Making Character-Bars, of which the following is a specification.

This invention pertains to the manufacture of impression-faces or characters, and especially to the manufacture of an integral line thereof, such, for instance, as embodied in some forms of linotypes or typebars.

The present invention relates in particular to a method of making characters, for example, printing types, from a blank of proper material, and to a method of making a series of such types from or on a single-piece blank to form an integral line of type which it is intended shall constitute the printing portion of a linotype or typebar adapted for use in the typographic art for printing a line of composition, the invention including also as one of its features a typebar or linotype so formed.

In the printing art as heretofore practiced a line of printed composition has usually been produced from a line of separate composed types, or from a linotype formed by casting from a succession of properly assembled matrices, or the printing has been done from a stereotype, electrotpe, or similar impression member.

The present invention contemplates the manufacture of printing types or other characters or impression-faces, and the coördination of such types etc. into a line of printing members in a radically different manner; there being involved therein a mode of type production heretofore unknown in the art for obtaining results which have been secured up to the present time by the methods above referred to. That is to say, the practice of the present invention enables a typebar to be produced embodying a line of characters formed from a one-piece blank by shaping without the necessity of using extraneous heat successive portions of the blank to form therein a series of types having their printing faces in a given plane, the typebar so produced being adapted for use in the printing art as a satisfactory substitute for a printing member made in accordance with the various methods adverted to. It is to be understood, however, that the invention is not limited to the art of printing, as it is obvious

that various articles having an impression-face, character, stamp, die, or like surface can be produced in the same manner.

In the drawings accompanying this specification, the invention is by preference illustrated as applied to the manufacture of typebars or linotypes and blanks therefor, and in these drawings Figure 1 is a side elevation of a typebar-blank upon the edge of which a type-blank has been set off by cross-slotting the main blank. Fig. 2 is an end elevation of the slotted main blank. Fig. 3 is a plan of the type-carrying edge of the main blank. Fig. 4 is an end elevation of the typebar-blank illustrating one step involved in a preliminary preparation to which the stock may be subjected, this step consisting in the reduction or facing to a greater or lesser extent of the side face of the main blank at the type-carrying edge thereof. Fig. 5 is a side elevation of the blank and facing-tool shown in Fig. 4. Fig. 6 is an end elevation of the typebar-blank illustrating the facing of the opposite upper side face of the blank, resulting in the formation of a blank whose opposite sides near the type-carrying edge of the blank converge toward each other, as seen in end elevation of the blank. Fig. 7 is a side elevation of the blank and the facing-tool shown in Fig. 6. Fig. 8 is an end elevation partly in section, illustrating the beginning of a subsequent step in the formation of a type in which a die is applied to the blank. Fig. 9 is a similar view, illustrating the completion of this step and of the type. Fig. 10 is a sectional side elevation corresponding to Fig. 9. Figs. 11 and 12 are, respectively, a side elevation and a plan of a typebar-blank having a finished type thereon. Fig. 13 is an enlarged plan of a typebar-blank having three types of different sizes located immediately adjacent to one another on its edge. Fig. 14 is a side elevation of the same. Fig. 15 is a transverse section, taken on the plane of the line *a—*a** of Fig. 14, the typebar-blank and the die being shown in a position which they occupy during the operation of compressing the blank to form a type therein. Fig. 16 is a transverse section also taken on the plane of the line *a—*a** of Fig. 14, the die being removed. Fig. 17 is a transverse section of the typebar-blank, the section being taken on the plane of the line *b—*b** of Fig. 14. Fig. 18 is a plan of a finished typebar having a



series of immediately adjacent and justified types formed on one edge thereof. Fig. 19 is a side elevation of the same. Fig. 20 is a plan of a typebar-blank having a series of adjacent separated type-blank portions all of which have been first properly shaped and prepared to be ultimately made into a series of respective and predetermined types. Fig. 21 is a side view thereof. Figs. 22 and 23 are side elevations, partly in section, representing a simple species of mechanism for making types and typebars according to the present invention, and illustrating suitable operating instrumentalities for preliminarily preparing the type-formable material lying in the edge of the blank for treatment by a die. Fig. 24 is a similar view of such mechanism illustrating the formation of a type by a rolling process or operation, and sets forth that feature of the present invention according to which a type or character is formed by subjecting the material to the treatment of a die or other instrumentality as the blank and die are rolled with relation to each other. Fig. 25 is a transverse sectional elevation of the mechanism looking from the opposite side thereof and illustrates the driving-gear for actuating the various forming tools or instrumentalities used in preliminarily preparing a portion of the edge of the blank and for rolling a die thereover.

Similar characters of reference designate similar parts in all the figures of the drawings. In the attempt to manufacture from a single or one-piece blank, whose dimensions are approximately the same as the corresponding dimensions of the ordinary typebar, by the aid of dies or similar instrumentalities, a series or line of types, individually spaced at such distances from each other as ordinarily required in the typographic art, experience has shown that it is impracticable to make a satisfactory series of types by the mere application of simple dies pressed into the stock at successive points along the blank. The action of the material lying in the edge of the blank and in excess of that necessary for the formation of the type, has, during the operation of making one type, a detrimental effect upon a type immediately adjacent. Such material lying in, or immediately adjacent to, the respective character fields and intermediate of the respective and contiguous pairs of types to be formed, by its presence renders it practically impossible, therefore, to form in such a blank, by compression, a series of characters disposed sufficiently near to one another to meet the ordinary commercial requirements of typography. When types are attempted to be so made in close succession, portions of the excess metal displaced by compression is usually forced against and sometimes over the immediately adjacent type at the rear, and either distorts

such type as to position or contour or else by filling the depressions in the face of the type prevents the production of a satisfactory printed impression therefrom. It will be obvious that any such transfer of surplus stock as just described, will not only prevent the maintenance of properly formed types on the blank, but will also cause a disturbance of the relative position of the finished type, thus rendering impracticable methods of making lines of closely related types from one-piece blanks having approximately the breadth of linotype or typebar-blanks which depend upon compression only for shaping the successive characters, without taking into consideration the effect exerted by a movement in the excess material or stock.

The present method of character making, when applied to the manufacture of a line of types adapted for printing a line of ordinary composition, involves the removal of surplus material as one of its features, so that it will not interfere with a type already made during the operation of making a succeeding type. That is to say, portions of the stock of the blank contiguous to a finished type or types and which would ordinarily in the blank operate to impair finished surfaces will not be present to so operate when a portion or segment of the blank is compressed to form therein a type or character, nor will the satisfactory use of a finished type for printing be effected by a disturbance of the relative position of such type due to pressure caused by flowage of surplus material concurring with the next type-making operation or by the clogging of the face of such finished type through the overriding thereof. In other words, that phase of my invention involved in the production of an integral line of consecutive types embraces as one step the removal of portions of the edge of the typebar or other blank to form spaces, each of which is adapted to receive a portion at least of the flowage concurring with, and created by, the forces exerted by the working die when applied to the edge of the blank. Such flowage space will preferably extend into the character fields of adjacent characters or types, regarding such fields as extending lengthwise of the blank and bounded on opposite sides by imaginary lines drawn on the edge of the blank transversely to the length thereof at the middle points of the spaces which will eventually exist between adjacent types. While two steps, therefore, are involved in the production of such a series of types, one step consisting in the removal of a portion of the material of the blank to form a flowage space, and the other in the subsection of the edge of the blank to the action of a properly applied die, I do not wish to limit myself to a particular order of such operations, as the die may be operated before the surplus material is removed, or



the surplus material may be removed before the die has come into action, or the operation of the die and the removal of the material may take place practically simultaneously.

Any means operative for the purpose may be employed for removing a portion of the edge of the blank.

In the drawings, a typebar-blank adapted to have formed on an edge thereof a series of integrally connected types is designated by B, and in the form thereof shown herein, the bar or blank is a one-piece blank, that is, the main portion thereof is integral with that portion from which the types are to be formed. It will be understood, however, that the present invention pertains to the various operations involved in the making of types on the type-carrying edge of a typebar, and hence, this edge portion may be separate and distinct from the member by which the types are supported when used for printing.

The blank from which the types are to be made may be of any suitable material, being preferably of relatively ductile material in order that the stock may be shaped by ordinary metal-working tools, and the types formed without the expenditure of an undue amount of power. The device illustrated herein for reducing or slotting the edge of the blank and removing material therefrom is designated by *u*, it being shown in the form of a saw adapted to form a transverse slot 91 in the edge of the typebar-blank, and thereby remove a portion of the stock. In some of the figures of the drawings, a slot is shown as formed in the edge of the blank prior to the application of the die thereto, thus setting off a type-blank adjacent to the slot, as indicated by 89. If this mode of procedure is adopted and a type-blank is set off on the edge of the typebar-blank prior to the compressive action of the proper die, a flowage space will be created at each side of the type-blank which will accommodate the material flowing lengthwise of the blank in both directions as the die and the blank are forced against each other. It is obvious, moreover, that this slotting can be done in other ways without departing from the spirit of my invention, and if that mode of carrying the invention into practice is adopted in which type-blanks are preliminarily set off on the edge of the main blank prior to the occurrence of die treatment, cast blanks may also be employed in which such set-off portions or blank segments are individually separated from each other.

It should be stated here that in order to provide a stiff base at each end of the bar or blank for the formation of the terminal types thereon, and in order also to space these terminal types at the proper distances from the respective column, dividing rules usually locked up in the form with the type-

bars, the linotype blank B may have the opposite ends of its upper edge cut away or faced, as shown, (see 90 and 90', respectively.)

As a part of the general operation of making typebars, although this step may not be necessary in every instance, I prefer to reduce or trim the upper side face, or corner of the typebar-blank prior to the application of a die thereto to a relatively small width measured crosswise of the blank as compared with the corresponding width of the blank at points depthwise of the blank and remote from its extreme upper edge, thus bringing the edge portion of the blank to a tapering or relatively pyramidal form, as seen in cross-sectional view. In the present case I have shown and designated by *r* in Figs. 4 and 5 a reducing-tool having a cutting edge adapted for removing or facing a corner portion of the blank to form an inclined face 92 extending a considerable distance in the direction of the depth of the blank, while in Figs. 6 and 7 I have illustrated the same tool as operative for removing or facing the opposite corner of the blank to form an oppositely-inclined face 93.

The final step of forming a type is indicated in Figs. 8 to 10, inclusive, a suitable die, designated in a general way by *t*, having in the end thereof a type character in intaglio corresponding to the type which it is desired to form upon the edge of the blank. In Fig. 8 the die-carrying tool is illustrated as about to descend and compress the stock, while in Figs. 9 and 10 the finished type is designated by 94 and shown as having been shaped by the descent of the tool.

The typebars herein described may be formed by various means, as, for instance, by the action of hand-operated tools, such as indicated, but in practice the typebars will usually be produced by a machine having suitable type-forming mechanism, such a machine being shown in my companion application hereinafter referred to, to which reference may be made. In forming a character or type on a blank, I prefer, however, and herein there is embodied a further and distinct feature of the present invention, to subject the material of the blank to the rolling treatment of a type-die or like instrumentality. This result may be accomplished in consequence of rolling the type-making members (that is, the die and the blank) with relation to each other, as disclosed, for example, in my companion application, Serial No. 600,151, of even date herewith. This subjection of the stock to a rolling treatment may conveniently be effected in the manufacture of a single type or a line of types, and whether the blank has been preliminarily prepared or not as aforesaid, by rolling the die or dies across the edge of the blank. I prefer to roll the blank and a die



in relation to each other in a direction transverse to the length of the blank, since when so rolled the tendency to flowage is in a corresponding direction, and hence the flowage created by the compression of the material of the blank will exert a less tendency to mar an adjacent and finished type than if such rolling movement were not in this direction.

It will be noticed by reference to the blank indicated in Figs. 11 and 12, which illustrates that particular mode of practicing the present invention in which a transverse slot for creating a flowage space has been preliminarily formed in the edge of the blank, that the action of the type-making instrumentality when brought into engagement with the blank causes a displacement of stock longitudinally of the typebar-blank. Such flowage is not, however, sufficient, ordinarily, and as represented to fill entirely the upper portion of the transverse slot 91 immediately adjacent to the type, since the flowage-space made by the saw is designed to be of such width as to accommodate more than the flowage incident to a type-making operation performed on the stock at the immediate rear of the slot.

In Fig. 13 I have illustrated three distinct varieties of types located on the edge of the typebar-blank. In this view the first type is illustrated as having an impression face of relatively great width with that portion thereof which produces the upper portion of the printed impression extending close to one edge of a side face of the blank, a considerable portion of the opposite corner of the blank having been removed prior to the action of the character-forming die, while only a small portion of the first-mentioned or upper corner of such blank has been cut away. The second type is shown as having its face comparatively narrow and as formed from a portion of the edge of the blank, the opposite extreme corner edges of which portion have both been removed by the cutting away of considerable parts of the metal. The third type is represented as being one for the formation of which the blank section has been previously trimmed in substantially the same manner as the edge of the corresponding side face of the blank section for the second type, the opposite corner edge of the blank lying in the character field not being faced, however, for a distance extending the entire width of the latter, but being removed for a portion of such length only. The type-forming die, should, of course, in each case, conform to the size and contour of the type to be formed. If the rolling of the stock be continued until after the flowage induced during the earlier stages of the working of the die has contacted with the flowage extending into the space at the rear, forwardly of the last-formed type, the metal is then supported at the rear to a considerable degree and fur-

ther flowage or movement of the metal takes place to the greatest extent in the direction of and into the last-formed space, that is, the space in advance of the section under the working die (in the event that such space has been made prior to the application of the die), and since the type formative stresses can more readily produce a movement in this direction than in the opposite, this they do with the result of partly filling this forward space. Figs. 13 and 14 illustrate clearly the result of the action of the dies in displacing the material of the blank and forcing such material into the adjacent transverse slots or spaces 91. It will be noticed in these particular types that the displaced metal or flowage is carried substantially half way across the slot from each side thereof, and that while the types are integrally connected with each other, yet they are separated by relatively narrow spaces of gradually increasing width, a condition typical of the results usually obtained in practice, so that neither the formation nor the position of any type in the series is in any way affected by the shaping of any other type. It is also to be observed that the body of the typebar-blank and the base of each type-block are substantially uncompressed and that the action of each type-forming die is effective to compress and produce a flowage in the upper portion only of the blank, thus producing a type having a compressed face adapted to oppose a proper resistance to the action of a cooperating impression member when mounted for operation in a printing-machine.

In Figs. 18 and 10 I have illustrated a complete typebar or linotype formed in accordance with my method as hereinbefore described, a series of non-contiguous and separated transverse portions of one edge of the blank being shown as having been reduced, or in other words, the blank as having been cross-slotted for the formation of flowage spaces at distances from each other along the length of the blank determined by the width and location of the respective types. In these views the several words are shown as separated by word-separating space-portions. Such spaces may be formed in exactly the manner hereinbefore described, with reference to the forming of a type, with the exception that the side faces of those portions of the edge of the blank to which the space-forming dies are applied are faced or reduced to a greater extent than the corresponding parts of those portions of the edge of the blank upon which the types have been or are to be formed. In these views, moreover, the several types are illustrated as occupying portions of the length of the blank corresponding exactly to the spaces which hand-set and composed types would take up in the same line, and in addition to this the several words



are separated by equal spaces so that the complete bar formed by the action of the tools in the process of shaping the several characters or types in the line is a justified typebar exactly as a correspondingly-spaced series of composed types set up in any manner heretofore known in the art is said to be justified. Hence my invention contemplates the production, as an article of manufacture, of a typebar having on one of its edges a series of immediately adjacent word-related and integrally connected types formed with compressed faces. In this type-bar, moreover, the types in practice will be justified and they are separated from one another by narrow transverse spaces, surplus material having been forced into these spaces during the formation of the respective types.

While I have described the typebar as having a body of substantially uncompressed metal, it will be evident that this is the case only with respect to the result of the type-making operation when comparing the faces of the types with the body of the blank, as in practice the typebar-blanks will preferably be formed by the usual rolling operations employed for forming bar and sheet metal, or they may be made by casting, or in any other well-known way.

In Figs. 20 and 21 I have shown a blank which has been preliminarily formed with a series of set off portions or blank segments each of proper dimensions and shape to be made into a series of types, such, for instance, as illustrated in Figs. 18 and 19. This blank may be formed in any proper way; for example, by hand, machine, or by casting, and the respective predetermined types can then be made by any desirable and proper means, or, for instance, by the machine described and illustrated in my concurrently pending application referred to.

I have shown in the present application (see Figs. 22 to 25 of the drawings) a simple mechanism similar to that illustrated in my companion application, but with many of the duplicate and other parts not necessary for making a single type by a rolling operation, omitted. It should be understood, however, that the mechanism here illustrated is merely one form that may be used, and while complete for the purpose of forming a single type, is not capable of making, selectively, a plurality of types, and hence is not the construction preferred for carrying my invention into effect; the preferred mechanism for this purpose being fully illustrated and described in my companion application aforesaid. In the mechanism which I have illustrated in the present case, however, the devices shown are adequate for making single type, and are, therefore, sufficient for the purpose of illustrating the method of making a type on a blank by a rolling or like operation in which the type-making tool

subjects the material of the blank to a rolling action.

In the construction illustrated, the various parts are mounted upon a suitable support, such, for example, as the annular frame 3. Within this frame a turret may be located for operation and carry various reducing and forming tools similar to the hand-operated tools hereinbefore described. This turret may be of any suitable construction, and is designated herein in a general way by T, it being supported in this case by a main shaft 5, which may be carried at its opposite ends in suitable bearings, these bearings being omitted from the drawings in order that the working parts may be seen clearly. For the purpose of supporting and operating the tools employed, the turret T in the construction set forth has three tool-carrying shafts, designated, respectively, by 6, 7, and 8, these shafts being mounted in parallelism with one another, and each of the shafts having fixedly secured to it a pinion, these pinions being designated by 6', 7', and 8', respectively, and being all of equal size. As a means for actuating these pinions and their respective shafts, a large spur-gear 9 may be utilized, said gear being loosely mounted upon an eccentrically-disposed stud 10, carried in fixed relation with the rotary turret and the main driving-shaft, and the spur-gear meshing with all of said pinions, so that the pinions will rotate in unison. The pinions 6', 7', and 8' are located adjacent to corresponding ends of the shafts 6, 7, and 8, and the trimming and type-shaping devices which I deem it desirable to make use of are preferably mounted near the opposite ends of these shafts. In this case the shaft 6 carries a side-cutting tool  $r'$  similar to the cutter  $r$ , while the shaft 7 may support another cutter  $s'$  somewhat smaller than the cutters  $r$  and  $r'$  but mounted so as to operate upon the opposite edge of the blank B from that which is cut by the tool  $r'$ . The shaft 8 may support a type-die  $t'$  similar to that designated by  $t$ . In a practical working machine a plurality of similar tools will ordinarily be mounted on, or form a part of, proper tool-carriers or tool-heads, such as 12, 13, and 14, carried respectively, by the shafts 6, 7, and 8. In the illustrated construction, the die  $t'$  is formed as a part of the tool-carrier 14, while the cutters  $r'$  and  $s'$  are shown to be so mounted as to be adjustable in channels in the tool-carriers 12 and 13, suitable clamping-screws 12' and 13' being employed to hold the tools in place in their adjusted positions. A portion of the periphery of each of the tool-carriers 12, 13, and 14 is left blank in order that said carriers may clear the typebar-blank when the shafts 6, 7, and 8 are not rotating, the various tools being then inoperative.

The slot-forming reducing-tool which I



prefer to use is illustrated herein as a saw  $u'$ , similar to that designated by  $u$ , and it has its cutting edge substantially concentric with the axis of the turret when the saw is in its inoperative position. This saw is pivoted on the turret in the present case, as by a rock-shaft, such, for instance, as indicated and designated by 15, and it is preferably mounted on a carrier such as 17 which is separate therefrom, although the carrier and the shaft 15 may be formed integral with each other. The slot-forming tool or saw is in the present case normally held up out of operative relation with the typebar-blank B as the turret rotates, and as a means for holding the tool in this position a brake-bar 19; carrying at the end thereof adjacent to the free end of the saw a brake-shoe 19', is shown as fixedly secured to the carrier 17 and as spring-held so as to maintain the brake-shoe normally in engagement with a peripheral cam-face 6'' of the shaft 6. In the present instance the brake-shoe is held against said cam-face by means of a spiral-spring 20, coiled around a pin or stud 21 in fixed relation with the turret and pressing against the inner end of the brake-arm, the free end of the pin extending through an aperture in the inner end of the brake-arm. Normally the spring 20, which is a compression-spring, will exert a force sufficient to hold the brake-shoe against the cam-face 6'', but if the shaft 6 be rotated the brake-shoe will be carried off from said cam-face and will bear against the periphery of the shaft, the free end of the saw being carried at the same time outside of its normal path of movement and into position for transversely slotting the typebar-blank.

From the foregoing description of the operative connections for the slot-forming tool or saw, the side-cutting tools  $r'$  and  $s'$ , and the character-impressor or die  $t'$ , it will also be apparent that on the actuation of any shaft, such, for instance, as the shaft 8, all of the shafts 6, 7, and 8 will be rotated, and all the tools  $u'$ ,  $r'$ ,  $s'$ , and  $t'$  will be brought into operative position and actuated for roughing out a portion of the edge of the typebar-blank, and for forming from such portion a character or type, it being understood, of course, that the main driving-shaft 5 and the turret are rotated in some suitable manner, as by the turning of a handle or crank, such as  $h$ , secured to the shaft 5.

For the purpose of starting the rotation of the shaft 8, I may make use of some suitable latch, such as 28, which in the form shown is of simple construction and may be pushed in toward the center of the mechanism by hand, where it will lock itself in place in a manner which is well understood, a spring, such as 30, serving to hold it in place in the path of a starting-arm on the turret, while another spring 31 serves to hold the latch in its normal

position when it is pushed back by the resetting finger of the starting-arm. This starting-arm, to which I have just referred, is preferably carried by the shaft 8 and may be of any suitable form,—such, for instance, as that designated by  $w$ ,—it having in this instance a starting-finger adapted to strike against the projected latch and be swung around thereby, and as the turret rotates a resetting finger for pushing back the latch to its original normal position. When the starting-arm  $w$  and the shaft 8 are started rotating in the manner just described, the shafts 7 and 6 will also be rotated by means of the gear 9 and the small gears or pinions 8', 7', and 6', and all of the shafts 6, 7, and 8 will therefore move in unison; but as this action only takes place during the time in which the starting-arm is in engagement with the latch 28, it is evident that some other means must be employed to continue the actuation of the tool-shafts after the starting-arm has passed out of contact with the latch. I prefer to utilize the initial rotation imparted to these shafts by the latch and the starting-arm as the means for continuing the movements of the devices before-mentioned until the operation of forming in the blank a character or type has been completed. In the present organization of constructive details, the shaft 6, for the purpose of continuing the initial rotation of the tool-carrying shafts, has thereon a spur-gear 33 shiftable longitudinally on the shaft and held against rotation relative to the pinion 6', guide-pins 34 being secured to one of these gears and passing through the other in order to permit the shifting movement of the gear 33. For the purpose of carrying the spur-gear 33 into and out from engagement with its driving internal-gear, which is concentric with the axis of the turret, a pair of cams, such as 36 and 37, may be provided, mounted in fixed relation to said gear 33, the former of which cams has its cam-face inclined in one direction and is adapted for coupling said spur-gear to its driving internal-gear, and the latter of which has its cam-face inclined in the opposite direction and is so disposed as to release the spur-gear from said internal-gear after the operation of making a character or type has been completed.

In the present case the main frame 3 constitutes the gear-carrier and supports the main internal driving-gear and two others concentric therewith. The main internal-gear (which is designated herein by 38) is concentric with the axis of the turret, and is so located that when the spur-gear 33 is shifted toward it, the teeth of this latter gear will mesh with those of the internal-gear. For the purpose of preventing undue friction and accidental clogging by reason of imperfect alinement, the co-acting faces of the teeth of



these two gears are beveled for a considerable distance, the beveling of the teeth of the internal-gear being clearly illustrated in Fig. 25.

5 It will be apparent that some suitable resistance-face must be opposed to the action of each of the cams 36 and 37 in order that the operations of coupling and uncoupling the spur-gear 33 and the internal-gear 38  
10 may be properly effected. These resistance-faces are shown in the drawings as oppositely inclined cam-faces formed by oppositely beveling the inner faces of a pair of cam-segments, such as 39 and 40, which segments  
15 will preferably be parallel with each other and in fixed relation with the gear-carrier or frame 3. In the normal operation of the turret mechanism the cams 36 and 37 are so disposed that each will be carried in an orbit  
20 by the turret and in operative relation with its respective cam 39 or 40. The coupling of the spur-gear 33 to the internal-gear 38 is dependent upon the fact that when the starting-arm *w* is engaged by the latch, the rotation  
25 of the shaft 6, resulting therefrom, as the turret rotates, causes the cams 36 and 37 to rotate with said shaft 6 relatively to the turret, and thereupon, when the cam 36 comes opposite the cam-face of the segment 39, said cam  
30 will be forced up such cam-face and the gear 33 will be shifted lengthwise of the shaft 6 into mesh with the gear 38. At some period subsequent to the completion of the type, the cam 37 will come into engagement with the  
35 cam-face of the segment 40, and will be carried up such cam-face in a lateral direction opposite to the direction of movement just described with reference to the cam 36, thereby uncoupling the spur-gear 33 from the  
40 main internal-gear 38. The construction and organization may be such that the two cams 36 and 37 are returned to their normal positions by the striking of the cam 37 against the abutting end of the segment 39. When  
45 the cam 37 strikes the end of this segment 39, said cam is turned to its normal position, and practically simultaneously the brake-shoe 19' is brought into engagement with the cam-face 6'' to restore the slotting tool, the side-  
50 cutting tools, the die, and the starting-arm to their normal positions.

The internal-gear 38 constitutes the main driving-gear for revolving the spur-gear 33 and thereby actuating the several tools as  
55 hereinbefore described, but it is not the only driving-gear employed herein. The principal reason for this is that each of the shafts 6, 7 and 8 has its axis at a different distance from the axis of the main driving-shaft 5, in  
60 order that the cutters and the die may be carried in proper paths. In order to properly drive the various devices, I have illustrated herein two other internal-gears 42 and 44 for  
65 co-acting directly with the spur-gears or pinions which rotate the cutter-shafts. All of

these internal-gears are of different diameters, as will be evident, and they are preferably disposed in parallel planes with their pitch lines concentric with the axis of the turret.

70 The spur-gear 33 which meshes with the gear 38 has already been described, and is shiftable as stated longitudinally of its shaft, but the spur-gears which co-act with the internal-gears 42 and 44, and which are designated by 41 and 43, respectively, are fixed to  
75 the respective shafts 7 and 8 and do not slide thereon. Each of these gears 41 and 43 has teeth around a portion only of its periphery, that portion of the periphery of each of the  
80 gears which comes opposite its respective internal-gear when the shafts are held in their normal position relative to the turret being blank, so that neither of the gears 41 and 43  
85 can at such time mesh with the teeth of the corresponding internal-gears 42 and 44. As soon as said gears 41 and 43 are started rotating, however, they mesh with the teeth of the respective internal-gears 42 and 44,  
90 and are driven by the latter, thus relieving the internal-gear 38 of much of the work and wear of driving.

Any suitable means may be employed for sustaining the blank B in position to be operated upon by the tools of the turret mechanism. A simple form of holder is shown  
95 herein and is designated in a general way by C, said holder having in this case a main fixed jaw 53 and a movable jaw 54 held together by one or more clamp-screws, such as 55.  
100 After one type has been formed as aforesaid, the blank may, of course, be shifted to a new position by loosening the clamp-screw and properly adjusting the typebar-blank.

This in brief is the operation of a simple  
105 species of mechanism for making typebars from cold-metal blanks by rolling successive portions of the edge of a blank in contact with type-forming dies, whether such portions have or have not been preliminarily  
110 trimmed or roughed out; but my process of making type may be carried out by any mechanism in which type are formed from a solid blank by compression and by removing surplus material not required for the making  
115 of the type, and material, which if present would operate during the working of a die to displace or distort an already formed type.

My invention is not, as before stated, limited to the production of types and typebars,  
120 although it is by preference illustrated and described as applied to such a purpose; nor evidently is the same in its broad aspect and as claimed herein limited to any particular  
125 speed at which the parts may be driven, since the various blank-treating members (and especially the die relatively to the blank) may be operated at any speed from the slowest movement to the highest of  
130 which the mechanism is capable; but this



feature of my present improvements, in point especially of the advantages that result from an operation at a particular speed or range of speed as compared with any other, constitutes the subject-matter of a separate application concurrently pending herewith. Obviously, moreover, the practical application of the present method to the making of types and lines of types does not require, in every instance, the necessary employment of all the various steps above enumerated and described, since these several operations may be variously combined with each other, while some of them may under varying circumstances be omitted altogether, and indeed be combined with other and well known metal-treating operations. Thus, for instance, and as already adverted to, the preliminary preparation of the portion of the blank to which the die is about to be applied may be dispensed with and the die rolled over the edge of the unprepared portion. Furthermore, while I deem such an application of the die to the blank as will result in a rolling treatment of the material of the latter crosswise of the blank as being productive of superior results, by reason of the fact that it produces a better type and the major portion of the flowage resulting from the die action is in the direction of rolling (a fact well known to those familiar with the art of rolling metals), that is, laterally or sideways of the blank, with a minimum flowage lengthwise of the blank or in a direction which would most tend to distort a finished type at the rear, yet the die may be applied to the trimmed or preliminarily prepared portion of the blank in other ways. Furthermore, the creation of a flowage space by the removal of material not needed in the making of a type, and which, if present, tends to cause a distortion of the finished type face or surface during the working of the next die, may also be dispensed with when the types to be made are of such character or are so located at points along the blank that they will be at such distances apart as will remove a finished type from the region of the stress induced by a working die, and the die merely rolled over the trimmed portion of the blank or applied in other ways to such portion subsequent to its having been roughed-out to the shape of the type-block to be made.

Having described my invention, I claim—

- 55 1. That improvement in the art of making a line of types, which consists in subjecting the material of a blank to a rolling formative treatment applied transversely to the line of length of the series of types when formed.
- 60 2. That improvement in the art of making a line of types, which consists in subjecting the material of a blank to the rolling action of type-making instrumentalities, the plane of the rolling being transverse to the line of length of the series of types when formed.
- 65

3. That improvement in the art of making a line of types, which consists in subjecting the material of a blank to a rolling formative treatment applied successively at successive points along the length of the blank. 70

4. That improvement in the art of making a line of types, which consists in subjecting the material of a blank to the rolling action of type-making instrumentalities applied successively at successive points along the length of the blank, the plane of the rolling being transverse to the line of length of the series of types when formed. 75

5. That improvement in the art of making a line of types, which consists in subjecting the material of a blank to the rolling action of selective type-making instrumentalities, selectively brought into an operative position. 80

6. That improvement in the art of making a line of types, which consists in subjecting the material of a blank to the rolling action of selective type-making instrumentalities, selectively brought into an operative position, the plane of the rolling being transverse to the line of length of the series of types when formed. 85 90

7. That improvement in the art of making type-bars, which consists in preliminarily trimming longitudinally of the bar that portion of the blank to which a type-making instrumentality is to be applied, and then subjecting the material of this trimmed portion to a compression of said type making instrumentality crosswise of said blank. 95 100

8. That improvement in the art of making type-bars, which consists in preliminarily trimming the bar blank longitudinally thereof at that portion to which the type-making instrumentality is to be applied, and in then subjecting such trimmed portion to a rolling treatment of said type-making instrumentality crosswise of said blank. 105

9. That improvement in the art of making type-bars, which consists in preliminarily trimming the superfluous metal from the opposite sides of that portion of a type bar blank to which the type-making instrumentality is to be applied and thereby reducing the area of the upper edge of the blank at that point, and then subjecting the material of such trimmed portion to the rolling treatment of said type making instrumentality crosswise of said blank. 110 115

10. That improvement in the art of making a type, which consists in preliminarily trimming that portion of a blank to which the type-making instrumentality is to be applied on its opposite faces and thereby reducing the area of the extreme upper edge of the blank at that point, and then subjecting the material of this trimmed portion to the rolling treatment of said instrumentality applied transversely to the line of length of the series of types when formed. 120 125 130



11. That improvement in the art of making a type, which consists in preliminarily trimming that portion of a blank to which the type-making instrumentality is to be applied  
 5 on opposite faces and thereby causing these faces to converge toward each other, and then subjecting the material of the blank to the rolling treatment of said instrumentality applied transversely to the line of length of  
 10 the series of types when formed.

12. That improvement in the art of making a line of types, which consists in preliminarily trimming those portions of a blank to which the type-making instrumentalities are  
 15 to be applied and thereby reducing the area of the extreme upper edge of the blank at those points, and then subjecting the material of the blank to the compression of said instrumentalities applied successively at suc-  
 20 cessive points along the length of the blank.

13. That improvement in the art of making a line of types, which consists in preliminarily trimming those portions of a blank to which the type-making instrumentalities are  
 25 to be applied and thereby reducing the area of the extreme upper edge of the blank at those points, and then subjecting the material of the blank to the rolling treatment of said instrumentalities applied successively  
 30 at successive points along the length of the blank.

14. That improvement in the art of making a line of types, which consists in preliminarily trimming those portions of a blank to  
 35 which the type-making instrumentalities are to be applied and thereby reducing the area of the extreme upper edge of the blank at those points, and then subjecting the material of the blank to the rolling treatment of  
 40 said instrumentalities applied successively at successive points along the length of the blank, the plane of the rolling being transverse to the line of length of the series of types when formed.

45 15. That improvement in the art of making a type, which consists in forming a flowage space by removing material in excess of that required for the making of the type, and then subjecting the blank to the rolling action of a type-die.

16. That improvement in the art of making an integral line of types, which consists in forming a flowage space by removing excess material in the region of the contiguous  
 55 sides of adjacent character-fields, and then subjecting the portion of the blank adjacent to such space to the rolling action of a type-die.

17. That improvement in the art of making an integral line of types, which consists in forming a flowage space by removing excess material in the region of the contiguous  
 60 sides of adjacent character-fields, and then subjecting the portion of the blank adjacent to such space to the rolling action of a type-

die, the plane of the rolling being transverse to the vertical and longitudinal axis of the blank.

18. That improvement in the art of making types to form a typebar by rolling portions of the edge to a typebar-blank without disturbing the material of adjacent portions thereof, which consists in forming flowage spaces in the region of the contiguous sides of adjacent character-fields by removing  
 75 material in excess of that required for the making of the types.

19. That improvement in the art of making a type, which consists in forming a flowage space by removing material adjacent to  
 80 and in excess of that required for the making of the type and preliminarily forming the portion of the blank to which the type-making instrumentality is to be applied, and in then subjecting such portion to the com-  
 85 pressing action of said instrumentality.

20. That improvement in the art of making an integral line of types, which consists in forming a flowage space by removing excess material in the region of the contiguous sides  
 90 of adjacent character-fields and preliminarily forming the portion of the blank to which the type-making instrumentality is to be applied, and in then subjecting such portion to the compressing action of said instrumen-  
 95 tality.

21. That improvement in the art of making an integral line of types, which consists in forming a flowage space by removing excess material in the region of the contiguous  
 100 sides of adjacent character-fields and preliminarily forming the portion of the blank to which the type-making instrumentality is to be applied, and in then subjecting such portion to the rolling action of said instrumen-  
 105 tality.

22. That improvement in the art of making an integral line of types, which consists in forming a flowage space by removing excess material in the region of the contiguous  
 110 sides of adjacent character-fields and preliminarily forming the portion of the blank to which the type-making instrumentality is to be applied, and in then subjecting such portion to the rolling action of said instrumen-  
 115 tality, the plane of the rolling being transverse to the line of length of the series of types when formed.

23. That improvement in the art of making typebars, which consists in first removing  
 120 a transverse portion of the edge of a typebar-blank to form a separate type-blank thereon, next reducing a type-blank to a relatively pyramidal form, and then subjecting the face of the pyramidal type-blank to the com-  
 125 pressing action of a type-die without distorting the preceding type and thereby form a type on the type-blank.

24. That improvement in the art of making typebars, which consists in removing  
 130



non-contiguous transverse portions of the edge of a typebar-blank to set off a series of separated type-blanks, and then subjecting the faces of the type-blanks to the compressing action of type-dies, thereby displacing material in a direction transverse to the vertical axis of the typebar-blank without distorting any type by flowage from another and forming a series of types, one in the face of each type-blank.

25. That improvement in the art of making typebars, which consists in removing transverse portions of the edge of a typebar-blank and thereby forming a series of separated type-blanks, in reducing the upper face of each type-blank to a relatively small area as compared with the area of its base, and in then subjecting the respective type-blanks to compression, thereby displacing material in a direction transverse to the vertical axis of the typebar-blank without distorting any type by flowage from another and forming a series of types, one in the face of each type-blank.

26. That improvement in the art of making typebars, which consists in removing transverse portions of the edge of a typebar-blank, and thereby forming a series of adjacent, separated type-blanks, in reducing each of said type-blanks to a relatively pyramidal form, and in then subjecting the respective type-blanks to compression upon their faces, thereby displacing material in a direction transverse to the vertical axis of the typebar-blank without distorting any type by flowage from another and forming a series of immediate, adjacent, separated type, one in the face of each type-blank.

27. That improvement in the art of making typebars, which consists in removing non-contiguous transverse portions of the edge of a typebar-blank to set off a series of separated type-blanks having their respective faces of predetermined lengths, and in then subjecting the type-blanks to compression upon their faces, thereby displacing material in a direction transverse to the vertical axis of the typebar-blank without distorting any type by flowage from another and forming a series of types, one in the face of each type-blank, and each corresponding in width with the length of the face of its respective type-blank.

28. That improvement in the art of making typebars, which consists in removing transverse portions of the edge of a typebar-blank and thereby forming a series of type-blanks separated by transverse spaces, in reducing the face of each of said type-blanks to a relatively small area as compared with the area of its base, and in subjecting the faces of the respective type-blanks to the compressing action of type-dies and forcing the surplus material of the respective type-blanks into the adjacent transverse spaces

without distorting any type by flowage from another and forming a series of adjacent types, one in the face of each type-blank.

29. That improvement in the art of making a line of type, which consists in preliminarily modeling at each successive type making operation those portions of the blank to which the type-making instrumentalities are to be applied, and then subjecting such portions to the compression of said instrumentalities.

30. That improvement in the art of making a line of type, which consists in preliminarily modeling at each successive type making operation those portions of the blank to which the type-making instrumentalities are to be applied, and then subjecting such portions to a rolling treatment by said instrumentalities applied successively at successive points along the length of the blank.

31. That improvement in the art of making a line of type, which consists in preliminarily modeling at each successive type making operation those portions of the blank to which the type-making instrumentalities are to be applied, and then subjecting such portions to the working treatment of said instrumentalities.

32. That improvement in the art of making a line of type, which consists in preliminarily modeling at each successive type making operation those portions of the blank to which the type-making instrumentalities are to be applied, and then subjecting such portions to the working treatment of said instrumentalities applied successively at successive points along the length of the blank and cross-wise of the blank.

33. That improvement in the art of making a line of type, which consists in preliminarily modeling those portions of the blank to which the type-making instrumentalities are to be applied, and then subjecting such portions to the rolling treatment of said instrumentalities, the plane of the rolling being transverse to the line of length of the series of types when formed.

34. That improvement in the art of making a line of type which consists in preliminarily modeling those portions of the blank to which the type-making instrumentalities are to be applied, then subjecting such portions to the rolling treatment of said instrumentalities applied successively at successive points along the length of the blank, the plane of the rolling being transverse to the line of length of the series of types when formed.

35. That improvement in the art of making type bars which consists in bringing into engagement a type bar blank and a type formative instrumentality, and then operating one of said members to subject said blank to a rolling treatment crosswise of the line of length of the series of types when formed.



36. That improvement in the art of making type bars which consists in bringing into engagement a type bar blank and a type formative instrumentality, and then operating one of said members to subject said blank to successive rolling treatments crosswise of the line of length of the series of types when formed.

37. That improvement in the art of making type bars which consists in preliminarily forming those portions of a type bar blank

to which the type making instrumentality is to be applied, then bringing into engagement such type bar blank and a type formative instrumentality, and then operating one of said members to subject said blank to a rolling treatment crosswise of the line of length of the series of type when formed.

DARIEN W. DODSON.

Witnesses:

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H. P. RICHARDS.