F. H. RICHARDS.

MANUFACTURE OF TYPE BARS.

APPLICATION FILED JAN. 14, 1899.

946,867.

Patented Jan. 18, 1910.

3 SHEETS—SHEET 1.

Fig. 1.

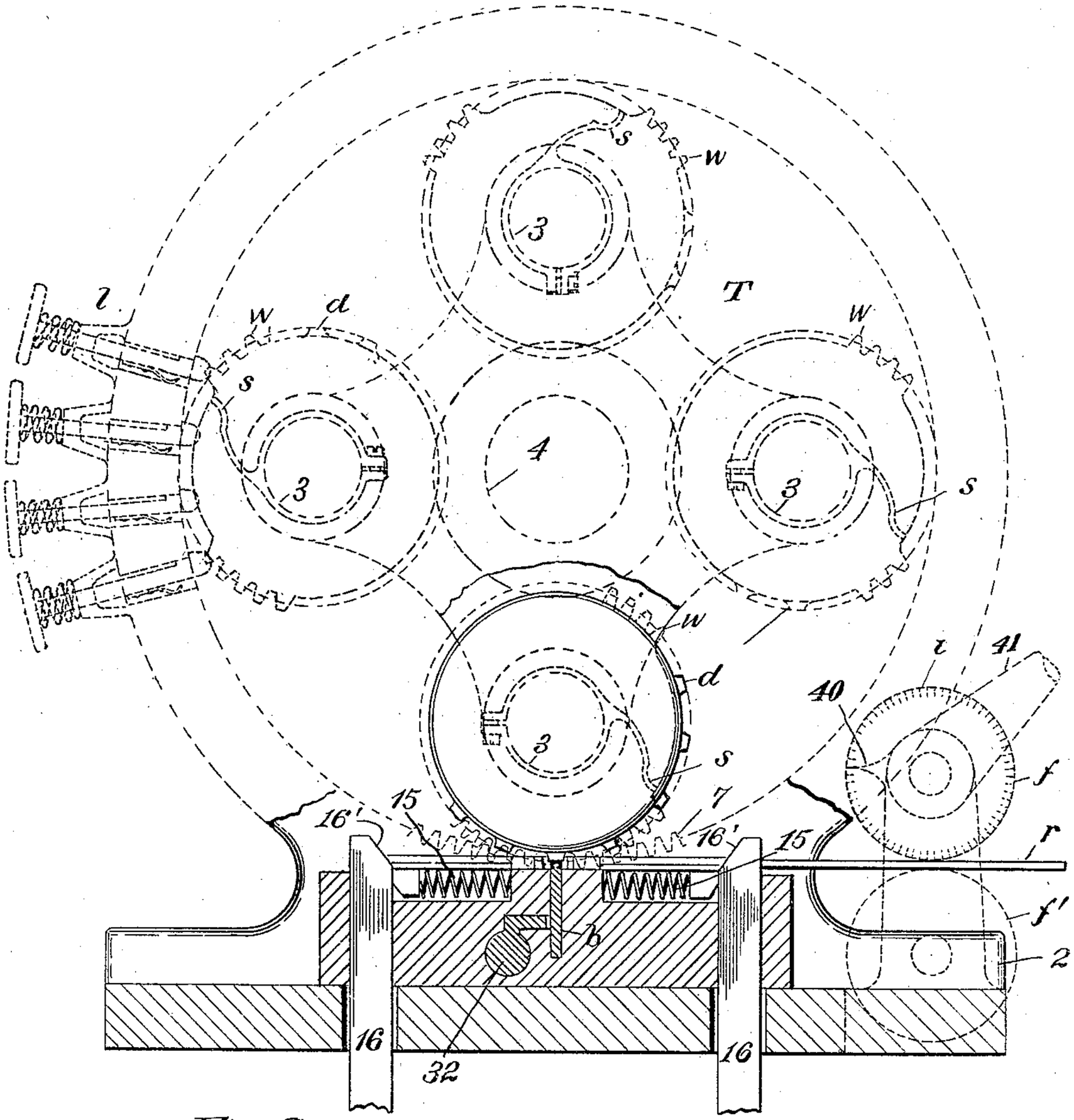
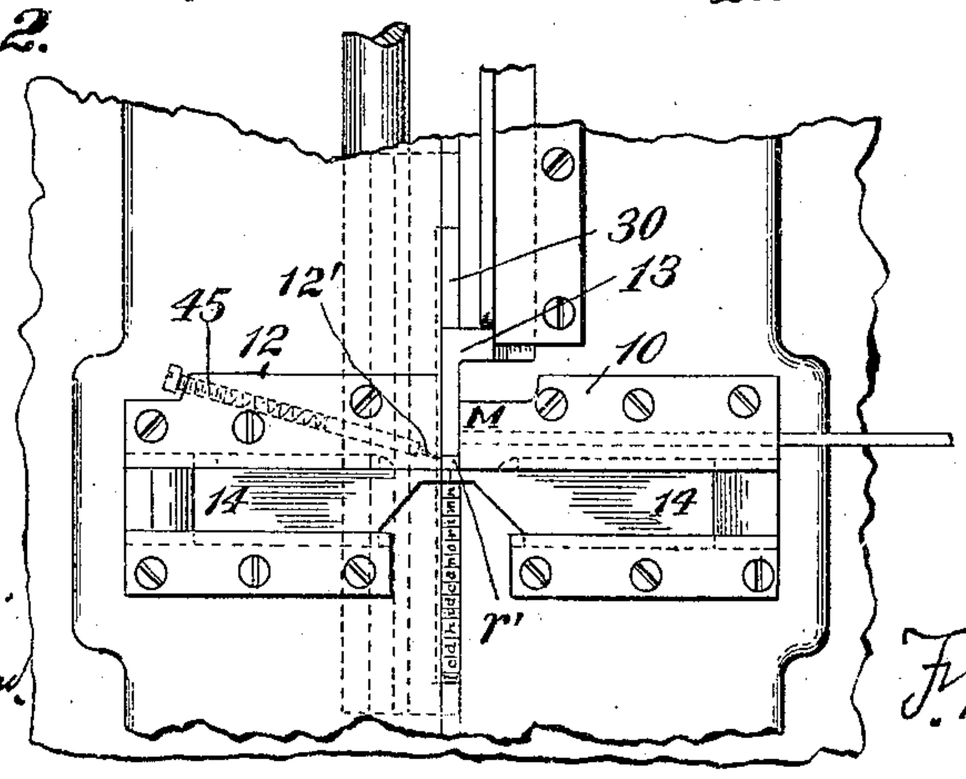


Fig. 2.



Witnesses:
R. W. Pittman.
E. C. Champion.

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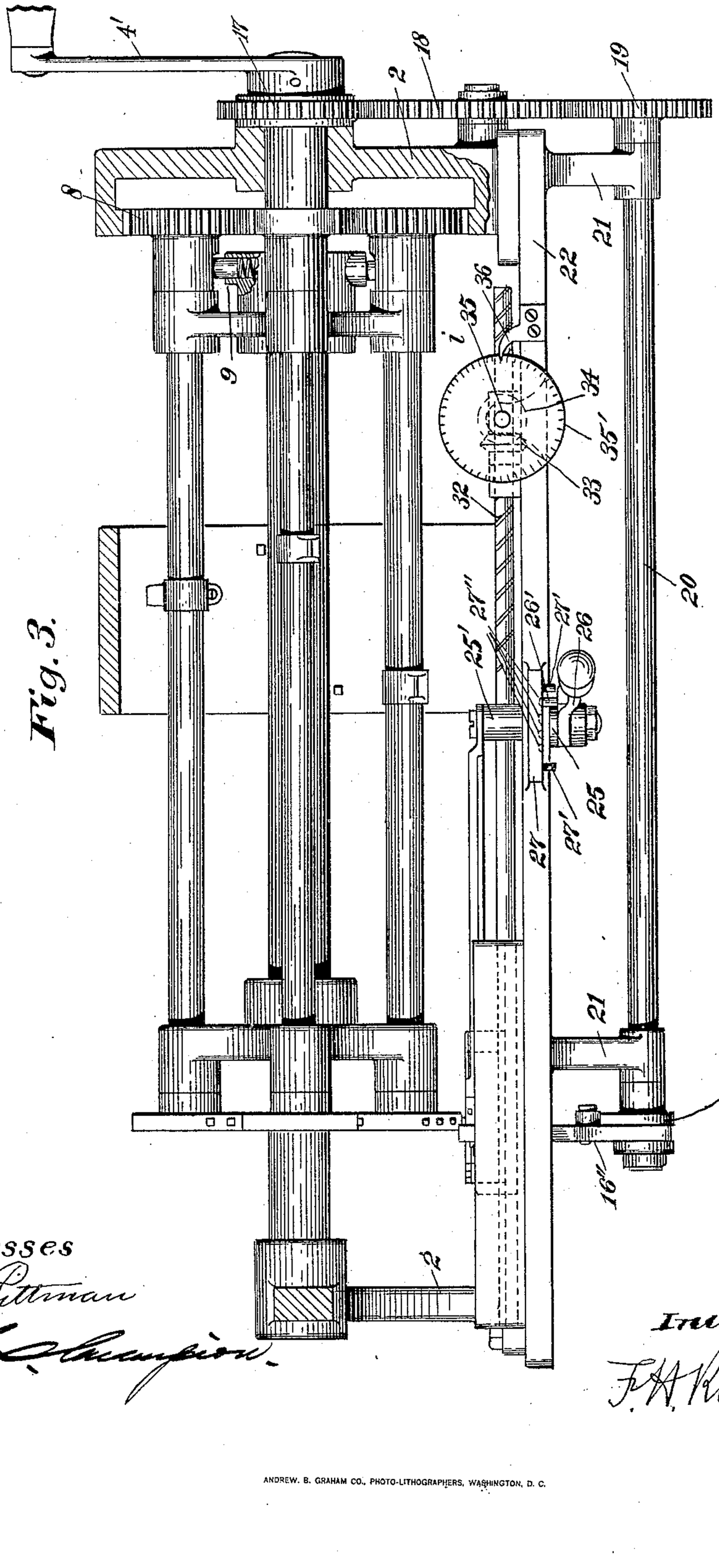
Fig. 3.



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3 SHEETS—SHEET 3.

Fig. 4.

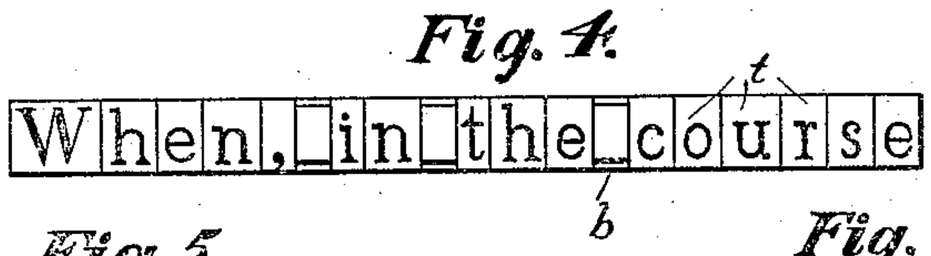


Fig. 5.

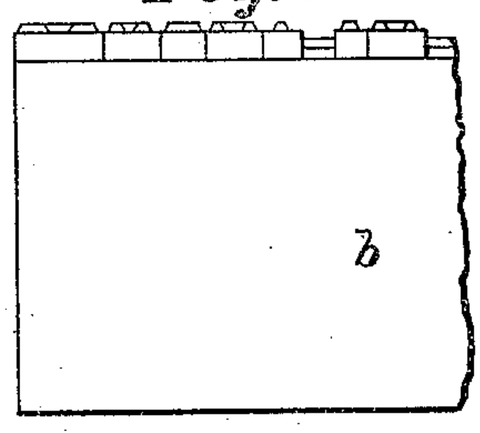


Fig. 6

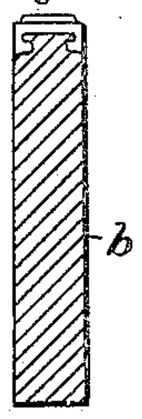


Fig. 9.

Fig. 7.

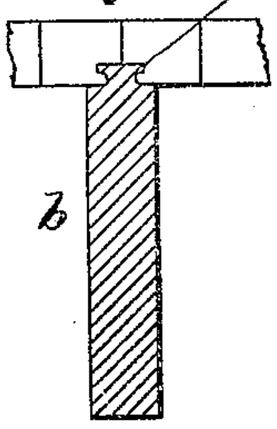


Fig. 8.

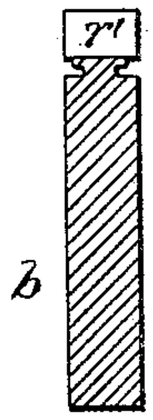


Fig. 10.

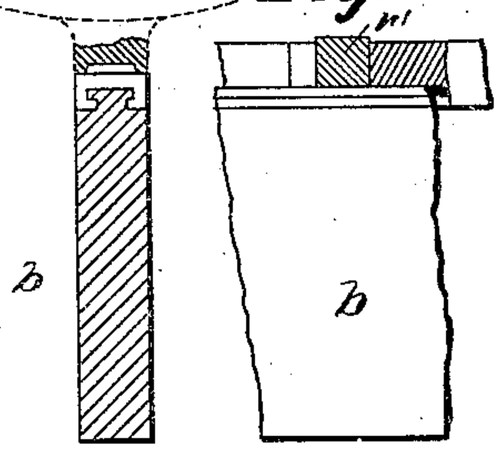


Fig. 11.

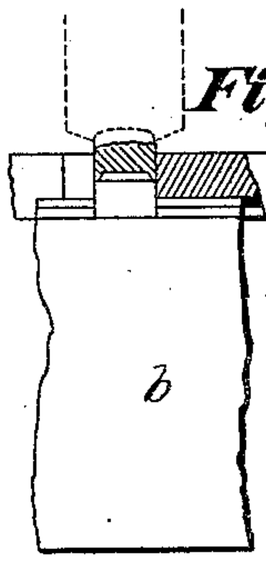


Fig. 12.

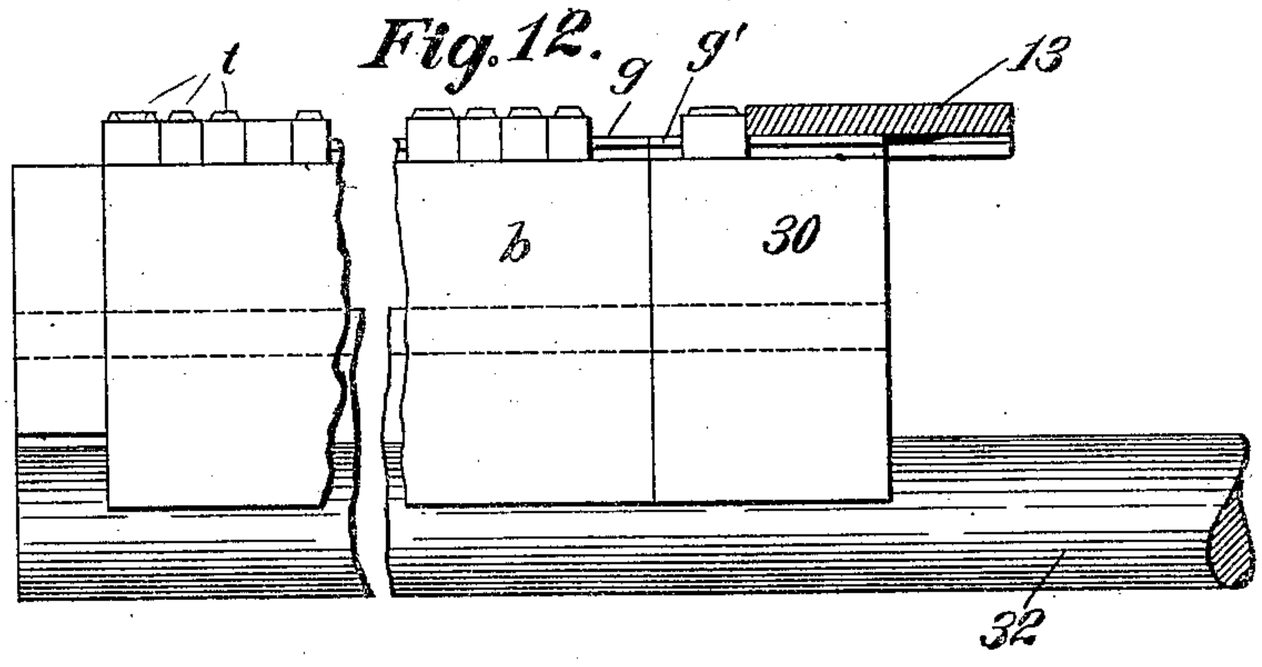
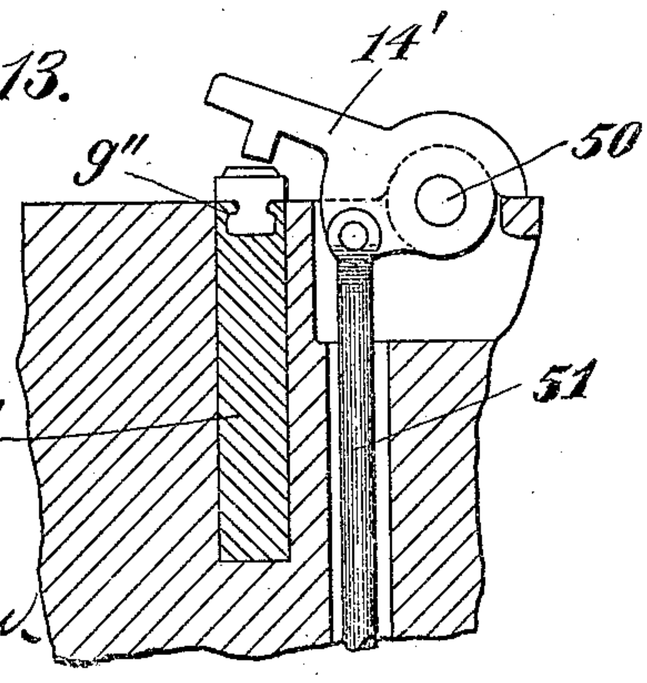


Fig. 13.



Witnesses;

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UNITED STATES PATENT OFFICE.

FRANCIS H. RICHARDS, OF HARTFORD, CONNECTICUT, ASSIGNOR, BY MESNE ASSIGNMENTS, TO AMERICAN TYPOGRAPHIC CORPORATION, A CORPORATION OF ARIZONA TERRITORY.

MANUFACTURE OF TYPE-BARS.

946,867. Specification of Letters Patent. Patented Jan. 18, 1910.

Application filed January 14, 1899. Serial No. 702,124.

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, having offices at 13 Murray street, New York city, New York, have invented certain new and useful Improvements in the Manufacture of Type-Bars, of which the following is a specification.

This invention relates to a method of manufacturing type-bars.

The regulation of the positions or justification of the matter in a line, for the printing of which any particular type-bar is adapted, is made by setting the word-groups of types at suitable distances apart along the edge of the bar. In the machine shown herein which constitutes no part of the present invention, but embodies an invention forming the subject matter of two separate applications, divisions of this present application respectively filed by me May 3, 1900, Serial No. 15,299 and renewed September 19, 1908, Serial No. 453,821; and July 13, 1901, Serial No. 68,137, the blank will usually be fed along step by step relatively to a type-forming mechanism, by means of which the type material (preferably supplied to the machine in the form of a wire of rectangular cross-section) will be shaped into regular type, and at the same time each type thus formed may have its type-body portion interlocked with the type-carrying edge of the carrier portion of the completed type-bar. In some cases this interlocking will be effected by placing the type body in engagement with the outside of a T-shaped or other suitable form of type-guide rib on the edge of the type-bar body, and in other cases said type body will be forced into a suitable retaining-groove formed in the same edge of said type-bar body.

My improved method of forming type is distinguished from all others of which I have knowledge by the fact that an essential feature thereof is the compression of the individual type-blank on to and into engagement with a suitable type-support to form a type engaged or interlocked with such support. Ordinarily this act of compressing the material or blank results not merely in the compression of the material into engagement with the support but also in the formation of the type itself, and hence the molding of the type and the interlocking thereof with the support are in practice simultaneous and are the result of one operation. In the preferred construction the type-support or type-bar body on to which the type-heads or type proper are molded will be so constructed that the finished types will be capable of being shifted or slid along such body, and hence I make use of a type-bar in which there is a type-guide of uniform character throughout its length, this guide being preferably on one edge of the type-bar body, and being either a rib or tongue projecting therefrom, or a groove or channel cut therein, and on to or into which the material of the type-blank may be compressed and engaged or interlocked therewith. As the result of this method I obtain a type in which the head or type proper thereof is separate from, but is interlocked with, a suitable supporting body, and hence I consider within the scope of my invention any type of this character in which the head is molded on to the body from cold metal. As my improved method is intended, however, more particularly for forming type-bars it will be evident that a type-bar body having a series of such type interlocked or engaged therewith is, commercially speaking, the principal product of the mechanism for carrying into effect my improved method of forming type-bars. Of course these separate type being shiftable longitudinally of the type-bar body—usually on a type-guide such as hereinbefore mentioned—may be spaced in any desired manner, and hence the different groups of characters, ordinarily word-groups, may be properly justified, as is customary in the production of other kinds of type-bars.

For the purpose of carrying my new method into effect and producing the improved type-bar just described I may make use of any mechanism suitable for the purpose. Ordinarily, however, it will embody as an important feature thereof type-forming mechanism coöperative with a type-support or type-bar body to compress on to, and hence form on, the latter and in engagement therewith a type or row of types which may

be molded in a suitable mold coöperating with the die in any proper manner. Here the type-support or type-bar body will form one wall of the mold, and the other walls of such mold may coact with such support or body to form a space substantially inclosed except at one side where a type-die is to be brought against type material which may be supplied to the mold. One or more walls of this mold may be movable not only for the purpose of permitting the removal of a finished type, but also for varying the size of the mold to permit the production of different sizes of type—that is, type of different widths when finished. In a complete mechanism for producing such a type-bar it is desirable to feed the type-bar body on to which the type are molded different distances, step by step, according to the size of the type to be formed, and a construction operative in this manner is shown herein. Moreover, while the type material may be supplied to the mold in any proper manner I deem it desirable to feed up to the mold a type-blank rod, preferably rectangular in cross-section, from which rod type-blanks will be severed or sheared, these type-blanks being of such lengths as may be necessary for the formation of the desired type. Hence this rod should also be fed different distances, and a variable-feed device is provided herein for this purpose.

As before mentioned, at least one side of the mold in which the type is formed should be movable, and in this case several walls of the mold are shiftable in different directions, but at least one of them is capable of adjustment for the purpose of varying the size of the mold according to the nature of the type to be formed therein, this wall being shifted by suitable feed mechanism to one point for the formation of a narrow type, and to other points for the molding of medium-width and wide types. The mold itself will be separable, and the several parts thereof may have, in the simplest construction now known to me, many different functions, one of them being operative—in the present case for varying the size of the mold—for pushing out of the mold a finished type and for shearing off from the type-blank rod a type-blank of any length, which may be determined by the feed mechanism. In connection with this mold I have also provided suitable means for permitting the escape of excess material from the mold, it being understood that in all cases it is desirable to supply to the mold type material or a type-blank containing a quantity of metal slightly in excess of that necessary to make the type for which the mold may be adjusted. In this construction, therefore, I have illustrated means for permitting the escape of this surplus, an outlet-opening being shown herein and closed by a resistance device or plug held in place in any suitable manner—as by a spring—the force of this being overcome by the surplus metal when the type is formed.

The above-mentioned and other novel features of my invention not hereinbefore particularly referred to will be described in detail in the accompanying drawings, in which—

Figure 1 is a sectional end elevation, partly in outline, of a portion of a type-bar-forming apparatus, illustrating a simple form of mechanism for carrying my invention into effect and producing my improved type-bar. Fig. 2 is a detail plan view of a portion of the apparatus, showing the mold and coacting devices. Fig. 3 is a side elevation with parts broken away and with the rod-feeding device removed, of my improved apparatus. Fig. 4 is an enlarged plan illustrating a complete type-bar constructed in accordance with my present invention. Fig. 5 is a side elevation of a portion of the same. Fig. 6 is a transverse section of the same. Fig. 7 is a transverse section of the type-bar body, illustrating two oppositely-disposed slides in position to form one end wall of the mold. Fig. 8 is a transverse section of the type-bar body with a type-blank in position thereon before compression. Fig. 9 is a similar view illustrating said type-blank compressed by a type-die. Fig. 10 is a detailed side elevation, partly in section, corresponding to Fig. 8 and showing the type-blank located in place and held endwise between the transverse walls or plungers of the mold. Fig. 11 is a detailed sectional side elevation corresponding to Fig. 9, and illustrates the formation of the finished type by the compressing action of the type-die. Fig. 12 is a side elevation, broken in the center, illustrating the type-bar body and its feed-rod, said body having thereon a series of finished type, this view illustrating the manner in which the last type of the row is formed on a feed-slide alined with the type-bar body and having a type-guide similar to that of such body in order to permit the sliding of the finished type off from the feed-slide and on to the type-bar body. Fig. 13 is a sectional detail illustrating a modification of the invention, in which the type-bar body is grooved or channeled instead of having a tongue or rib projecting therefrom, and in which also a different type of end wall is provided for closing one end of the mold.

Similar characters designate like parts in all the figures of the drawings.

Any suitable mechanism may, as before stated, be used for carrying my invention into effect, and the several operative parts will be mounted on any proper framework, such as that indicated in a general way by A, Fig. 3. Upon this framework I prefer to mount orbitally-movable rotary type-dies,

which may be carried by a rotating turret substantially in the manner shown and described in my prior patent, No. 403,216, granted May 14, 1889, to which reference may be had for a more detailed description of the several parts. Here this turret is mounted for rotation between end frames, such as 2, rising from the main framework A, and in this case the turret carries four shafts, such as 3, on which are carried die-wheels, such as *w*, provided with type-dies, such as *d*. Each of the shafts 3 will also carry a suitable starting-arm, such as *s*, as in my before-mentioned patent. For the purpose of starting the starting-arms, and hence the shafts of die-wheels and the dies, rotating I may make use of the usual starting-latches, which may be of a simple type, as indicated at *l*, the latches shown being spring-pressed ones, which will start the rotation of the shafts and will be reset or returned to their normal positions by the starting-arms *s*, substantially in the manner described in said patent. As many of these spring-pressed latches may be used as there are type-dies on the die-wheels, but only four are illustrated herein.

It will be obvious, of course, that the main shaft 4, carrying the several members of the turret T, should be rotated in order to permit the rotation of the die-wheels when any starting-arm comes into contact with a latch that may be set, and for the purpose of rotating said turret I have shown on said shaft 4 a crank or handle 4′, which, it will be understood, will be given one turn each time a latch is set.

One of the end pieces 2 is provided with a suitable internal gear, such as 7, with which the teeth of the gear-wheel segments 8 attached to the die-wheel shafts will mesh when said shafts are started rotating. The gear-segments 8 on the shafts 3 will be rotated selectively one at a time as the latches *l* are selectively operated, and when any gear-segment, its shaft, and the die wheel thereon have been started rotating, at the proper point such rotation will be stopped in some suitable manner, as, for example, by a spring-pressed detent 9 coming in contact with a flattened portion of the hub of the gear-segment.

The mold in which the type are to be formed may be of some suitable construction capable of coöperating with a die and the type-support to form type material into a finished type, which will preferably be engaged with such support. A mold suitable for this purpose is indicated in a general way by M, and it may be made up of a number of parts and preferably will be a separable mold two sides of which will be formed by fixed walls, such as 10 and 12, in juxtaposition with the sides of the type-support or type-bar body, which is indicated in a general way by *b*. In the preferred construction at least one end of the mold will be formed by a movable wall, which will be shiftable for the purpose of permitting removal from the mold of the finished type and which may also serve as a means for varying the size of the mold, said wall being in this case part of a slide 13 adjustable to different positions according to the width of the type to be formed. The other or forward end of the mold may be closed by one or more members shiftable toward and from their mold-closing positions, their movements in this case being transverse to the type-bar body and they being so constructed as to fit snugly over the type-guide on the type-bar body and completely close such end of the mold. These two slides, which form said end wall of the mold, are complementary to and in alinement with each other in the preferred construction and are designated in a general way by 14—14. Said slides may be normally spring-pressed away from the type-bar body to clear the latter, suitable springs, such as 15, being employed for this purpose, and said slides may be power-operated, as, by means of slides 16—16, having cam-faces 16′ for forcing the slides 14 together to close the rear end of the mold.

The operating-slides 16—16 will be actuated in some suitable manner, but in this case I prefer to control them directly from the main shaft 4 of the turret, and hence I have shown on said shaft a pinion 17, which meshes with an idler 18, properly supported on one of the end pieces 2 of the framework, said idler meshing in turn with pinions 19, carried on corresponding ends of shafts 20, journaled in bearings carried by hangers 21, depending from the under side of the base or bed 22 of the framework, said shafts 20 also having thereon suitable cams, such as 20′, coacting with rolls, such as 16″, on the slides 16.

It will be understood that although only one set of operating connections from the idler 18 is shown the other set does not appear in Fig. 3 because it is located in the rear of the first set and corresponds exactly thereto.

It will be apparent that when the crank 4′ of the main shaft 4 is turned the slides 16, and hence the mold-slides 14, will be operated in unison by the intermediate driving connections.

The inner ends of the mold-slides 14, where they coöperate with the adjacent face of the type-bar body *b*, are so shaped as to completely close the forward end of the mold, (see Fig. 7,) and when the type-bar body has thereon a type-guide in the form of a projecting rib or tongue, such as the T-shaped tongue *g*, of course the under sides or edges of the mold-slides 14 will be so shaped

as to form, when in contact with each other, a similar T-shaped recess, into which the rib *g* will fit. In the present construction it is intended that when the handle 4′ is in the position shown in Fig. 3—which is the normal position of the handle—the mold-slides 14 shall be open, and hence clear of the type-bar body and its guide, for the purpose of permitting a finished type to be forced out of the mold and slid along the type-guide to a position beyond—that is, in front of—the mold-slides 14.

The plunger or slide 13 on which the mold-wall is formed will be of some suitable construction. In this case the end thereof farthest from the mold-wall is connected to an eccentrically-disposed pin or stud 25′, secured to a short spindle 25, suitably journaled in the base 22 and having secured thereto an operating-handle or lever, such as 26, from which projects a pin or detent 26′. The body of the lever 26 is resilient in order to permit a slight raising and lowering of the detent-pin 26′, which latter in this case will have an extreme range of movement between two stops 27′, depending from a projection or plate 27 of the framework. In the under side of this plate there may be a series of recesses, such as 27″, into any one of which the end of the pin 26′ may be slipped for the purpose of locking the pin and the lever temporarily in place, the distance between the stops 27′ corresponding to the extreme range of movement of the slide 13, and hence of the mold-wall, while the distances between the locking-recesses 27″ represent unit-spaces, as does also the interval between the right-hand stop-pin 27′, as seen in Fig. 3, and the locking-recess adjacent thereto.

The four shafts 3, in the illustrated apparatus, are intended to carry dies of four different widths, and the right-hand stop-pin 27′ and the locking-recesses 27″ are so located and spaced as to permit the adjustment of the slide 13, and hence of the mold-wall, to set the latter and vary the size of the mold so as to enable the latter to control the production of finished type of four different widths. Hence if the lever is shifted from its normal position—which is in contact with the right-hand pin 27′—until the pin 26′ reaches the first locking-recess 27″, the wall will be set to form a mold-space one unit wide, and if the lever is shifted to the second, third, or fourth recess 27″ of course the mold will be two, three, or four units wide, as the case may be. The extreme movement of the lever 26 from one stop-pin 27′ to the other is intended to be independent in point of time of the movement just described, and such extreme movement is in this case for the purpose of shifting the finished type along the type-guide of the type-bar body *b* and locating it in its proper or final position on the type-bar body, unless of course re-positioning thereof should become necessary during justification.

In the construction illustrated herein not only does the type-bar body *b* have a type-guide *g*, but so does the actuating device or feed-slide by means of which such type-bar body is shifted or fed. This feed-slide may also be of any suitable type, but preferably will be substantially of the construction shown herein. Here it is a vertically-disposed slide 30, alined with and substantially of the same cross-section as the type-bar body *b*, said slide also having a type-guide *g′* similar to the type-guide *g*. In this case the feed-slide 30 is connected to and is operated in unison with a feed-screw 32. This feed-screw may be operated in any suitable manner—in this case by means of a bevel-pinion 33, which slides said feed-screw lengthwise but is connected thereto in some suitable manner so as not to travel longitudinally therewith. The pinion 33 may in turn be operated by another pinion 34, carried by a spindle 35, suitably mounted and having thereon an operating-wheel or dial 35′, containing an index *i*, coacting with a pointer 36 on the fixed portion of the framework. By turning this index-wheel the feed-slide 30, and hence the type-bar body *b*, may be fed forward any required distance equal to the width of the next type to be formed, it being understood of course that the graduations of the index *i* are equidistant from one another.

In the construction shown the slide 13 coacts, as before stated, with the type-bar body to close the rear end of the mold M at the proper time, and it is also intended to coact with the feed-slide 30 for the same purpose. For this reason I deem it desirable to support the slide 13 on the type-guide *g′* of the feed-slide 30, and this construction is shown clearly in detail in Fig. 12, from which it will be seen that said slide 13 is guided on the projecting rib *g′*. The object of this is to permit the formation of the last type of a complete series on the feed-slide 30 in exactly the same manner as the preceding type of such series have been formed on the type-bar body *b*. After being formed of course the finished type will be shifted from the slide 30 by the slide 13 and on to the type-bar body *b*.

The material from which the type are to be formed will be suitable for the purpose and will be delivered to the mold in some convenient manner, but I prefer to feed thereto intermittently a type-blank rod, such as *r*, preferably square in cross-section, which rod may be fed toward the mold in a suitable manner—as, by means of a pair of feed-rolls *f*—*f′*, the former of which has a graduated periphery or index *i′*, composed of equidistant graduations with which a suitable

pointer on the framework, such, for example, as the finger shown at 40, coöperates.

The feed-roll *f* may be turned by a handle 41 to feed the rod *r* any required distance, which, it will be understood, may correspond to the width of the type to be formed, the graduations of the feed-roll *f* being unit-distances corresponding to those of the index *i* and also to those between the recesses 27″. When a proper length of the rod has been fed forward, a type-blank *r′* will be severed therefrom in some suitable manner, but I prefer to shear it off by means of the slide 13. The amount of material so cut off may vary, as just stated, according to the size of type to be formed, but in every case the type-blank will be of a size slightly in excess of that required for making the finished type. This excess of material may be disposed of in a suitable way, preferably the surplus will be permitted to escape from an outlet-opening, such as 12′, in the mold-wall 12, this opening being controlled by a spring-pressed resistance device or plug, such as 45, which will be pushed back by the metal escaping through the outlet-opening 12′ when a type-die is brought down upon the type-blank or material in the mold. This surplus will be sheared off—in this case from the finished type—by the slide 13 as said type is being moved forward out of the mold-space, that edge of the outlet-opening 12′ which is adjacent to the finished type serving as a shearing device effective for this purpose.

The operation of an apparatus such as that hereinbefore described for carrying out my process for producing an improved type-bar of the class specified is as follows: It being assumed that there is a finished type in the mold-box to be disposed of the lever 26 is first turned from the extreme right-hand position in Fig. 3 to its extreme left-hand position, and the finished type is shifted along the type-guide and out of the mold-space, it being understood of course that at this time the mold-slides 14 are withdrawn from the type-bar body, the finished type then being clear of the mold-space and just beyond the forward side of the forward wall of the mold in order that it may clear the slides 14. The lever 26 is then returned to its normal position to the right in Fig. 3. Immediately thereafter one of the key-operated latches *l* may be actuated, the latch set of course corresponding to the type to be formed. Thereupon the handle 41 should be operated to turn the feed-roll *f* a distance corresponding to the width of the type which the latch just operated represents, and thereupon the rod *r* will be fed forward, and a portion of the rod will project over the type-bar body in a position somewhat in the rear of the mold-space. The lever 26 is then shifted from its right-hand position, as indicated in Fig. 3, until the detent-pin 26′ comes opposite and slips into that recess 27″ which corresponds to the width of the type to be formed, whereupon the lever 26 and the slide 13 cause the shearing off of a type-blank *r′* from the rod *r* and the location of such blank in the mold-space. The handle 4′ may now be turned to start the turret T rotating, and when the proper starting-arm comes in contact with the latch which was set such starting-arm and its shaft and die-wheel will begin to rotate, and this rotation will continue until the orbitally-movable rotary type-die corresponding to the latch selected is brought with a rolling action into contact with the type material or blank and compresses the latter in the mold, thus simultaneously forming a type corresponding to such type-die and engaging or interlocking said type with the type-guide on the type-bar body or on the feed-slide, as the case may be. Just before the compressing action, however, which is illustrated clearly in Figs. 9 and 11, the operating connections from the pinion 17 cause the slides 16 to be raised to bring the mold-slides 14 together, and thus close the forward wall of the mold-box. Each time the handle 4′ is operated it should be given a complete turn, during the first part of which the starting-arm will commence rotating and afterward will reset the operated latch, and during the last part of which the mold-slides 14 will be opened again. This series of operations may be repeated at will to produce a series of selected types of varying widths, which may be properly spaced along the type-bar body, either by leaving a blank-space between the separated groups of words, as shown in Figs. 4 and 5, or by forming quads between the word-groups in the same manner that the type themselves are formed. If merely a blank-space is left it will be unnecessary to set a latch during a cycle of operations. Manifestly the spaces which may be left between the word-groups or other groups may be of varying widths according to the manner in which the several parts are operated. In forming the last type of a series, there not being sufficient space at the extreme end of the type-bar body to carry out the several operations just described, the type-blank is operated upon while on the type-guide of the feed-slide 30 and after being finished is shifted to its proper position at the end of the line on the type-bar body, substantially as before described. The type *t*, formed in this manner, are perfect substitutes for the type or linotype ordinarily used in printing operations, but may be readily shifted along the body of the type-bar after completion, for the purpose of re-spacing or justifying the several groups of type. This will be evident when it is noted that during the formation of the type the latter is firmly engaged and

interlocked with a guide of uniform cross-section extending throughout the length of the type-bar body, and hence any sliding of the type along such guide will not impair the character of the printing to be done thereby.

In Fig. 13 I have illustrated at b' a modification of the type-bar body, in which the type-guide has a channel or groove g'', into which the type-blank is forced by the compressing action of the type-die when the latter is brought down thereonto. With such a type-bar body as this a different style of mold-wall is formed on a swinging arm, such as 14', which may be carried by a rock-shaft 50 and intermittently oscillated by a rod 51, controlled by suitable actuating means.

It will be observed that the rib of the type-bar b or groove of the type-bar b' is shown not merely of dovetail formation, but as an ogee dovetail, whereby the walls of the rib or groove are of curved form, which while permitting the efficient interlocking of the type with the bar, also facilitates the shifting of such type relatively to the bar.

Having described my invention, I claim—

1. The method of making types which consists in successively subjecting a number of blanks individually and while held in a mold to type formative pressure to thereby both form type and engage each such type with a separate type support, and in releasing each type from the mold and removing the same therefrom before making the next succeeding type.

2. The method of making type, which consists in feeding stock into position, severing a type-blank therefrom and then compressing the blank to form a type interlocked with a type-support.

3. The method of making typebars, which consists in successively compressing type-blanks to form types and slidably interlocking the same with a type-support.

4. The method of making type, which consists in compressing a type-blank to form a type slidably interlocked with a type-support and afterward shifting the type and trimming surplus material therefrom.

5. The method of making a typebar which consists in successively subjecting successive type blanks to respective type formative pressures to thereby both form a succession of types and concurrently with their formation cause the engagement of the individual types with a separate support.

6. The method of making a typebar which consists in intermittently feeding stock into position, in severing type blanks therefrom, and in subjecting each type blank in succession to a type formative pressure to thereby both form a type and cause the engagement of such type with a separate support.

7. The method of making typebars, which consists in successively compressing separate type-blanks into interlocking engagement with a type-support to form a series of types interlocked with said support and shifting the position of each type after it is made.

8. The method of making a typebar which consists in successively subjecting successive type blanks to respective type formative pressures to thereby both form individual types and cause the slidable engagement of each type concurrently with its formation with a separate support.

9. The method of making typebars which consists in successively subjecting successive type blanks to respective type formative pressures to thereby both form individual types and cause the engagement of each type concurrently with its formation with a separate support and in shifting said support after the formation of each type.

10. The method of making typebars, which consists in compressing a type-blank into interlocking engagement with a type-support and feeding said support and shifting the type relatively to the support before a second type is made.

11. The method of making a type which consists in subjecting a type blank inclosed by a separable mold to a type formative pressure to thereby both form a type and cause the engagement of such type with a separate type support and in then opening the mold to permit the removal of the type.

12. The method of making type, which consists in compressing a type-blank inclosed by a separable mold into interlocking engagement with a type-support; opening the mold to permit the removal of the type, shifting the type out of the mold; and feeding the type-support.

13. The method of making type, which consists in compressing a type-blank inclosed by a separable mold into slidable interlocking engagement with a type-support; opening the mold to permit the removal of the type; shifting the type out of the mold; and feeding the type-support.

14. The method of making a type-bar which consists in successively subjecting type blanks imposed upon the edge of a type-bar to type formative pressure and simultaneously with the formation of such type compressing such blanks upon the bar.

15. The method of making a type-bar which consists in feeding a blank on to the edge of a bar, severing a blank of sufficient area to form the type, subjecting the severed blank to type formative pressure, and simultaneously therewith interlocking such blank with the bar.

16. The method of forming a type-bar which consists in feeding a ribbon on to the edge of a bar, severing a blank therefrom of sufficient area to form the type, and then subjecting such severed blank to type forma-

tive pressure and simultaneously therewith interlocking such blank with the bar.

17. The method of forming type-bars which consists in forming independent or separate type from previously severed blanks, and simultaneously with such formation interlocking by compression each such type with the bar.

18. The art of forming types which consists in confining in a mold solid type material in excess of that necessary for the formation of a type, applying a type die to the mold confined metal, permitting the escape of the surplus material and applying pressure to the escaping material.

19. The art of forming a typebar which consists in forming on a body piece each of a plurality of types by confining in a mold on the edge of such body piece solid type metal in excess of that needed for the production of a type, applying a type die to the mold confined metal, permitting the escape of the surplus material against resistance, and forming a type and interlocking the same with the body piece.

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Witnesses:
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CHAS. FINKLER.