United States Patent

[11] 3,592,039

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[21] Appl. No. **766,196**
[22] Filed **Oct. 9, 1968**
[45] Patented **July 13, 1971**

[73] Assignee **Markem Corporation**
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[54] **APPARATUS FOR PRODUCING TYPE**
1 Claim, 19 Drawing Figs.

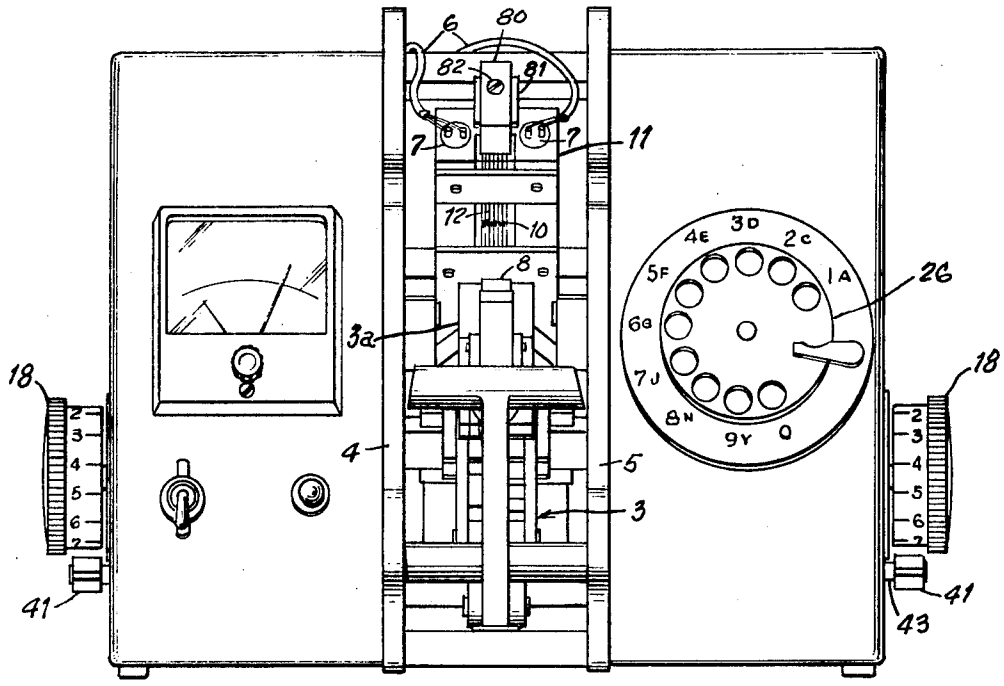
[52] **U.S. Cl.** **72/342,** 101/401.6, 199/8
[51] **Int. Cl.** **B21k 23/00**
[50] **Field of Search** 72/308, 310, 342; 101/401.4, 401.6; 199/8, 10

[56] **References Cited**
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Primary Examiner—Lowell A. Larson
Attorney—Frederick D. Goode

ABSTRACT: This disclosure relates to a manually operated apparatus which produces a bar or line of letterpress type characters. The desired legend can be mechanically established through a dial-type input linkage preparatory to actuation for preparing the typebar. This apparatus is especially suited to the preparation of typebars on which the character legend varies from slug to slug.

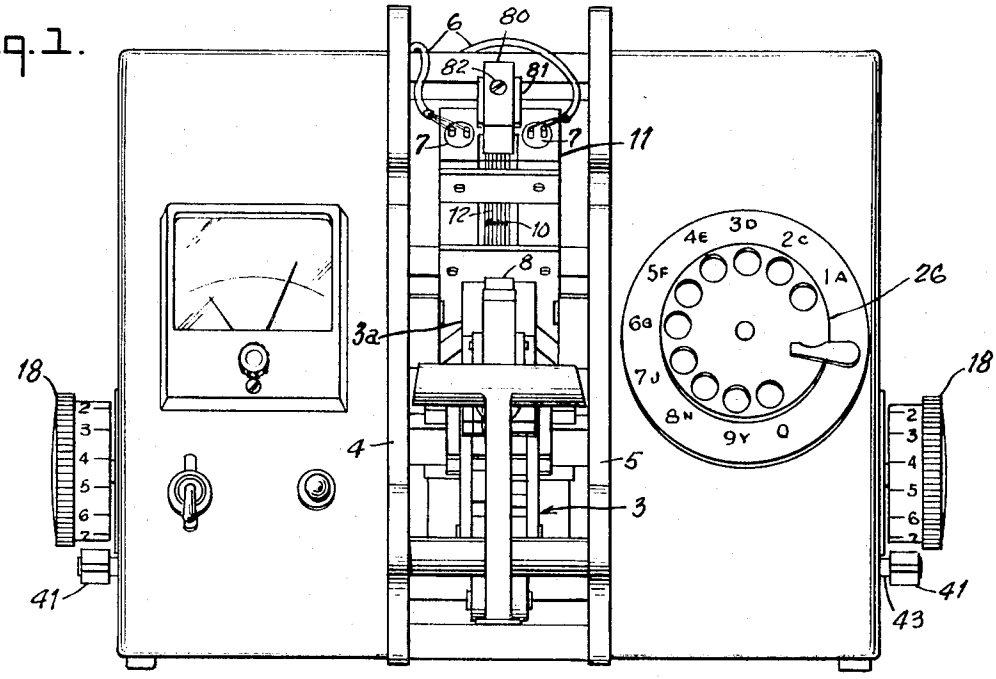


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SHEET 1 OF 6

Fig. 1.



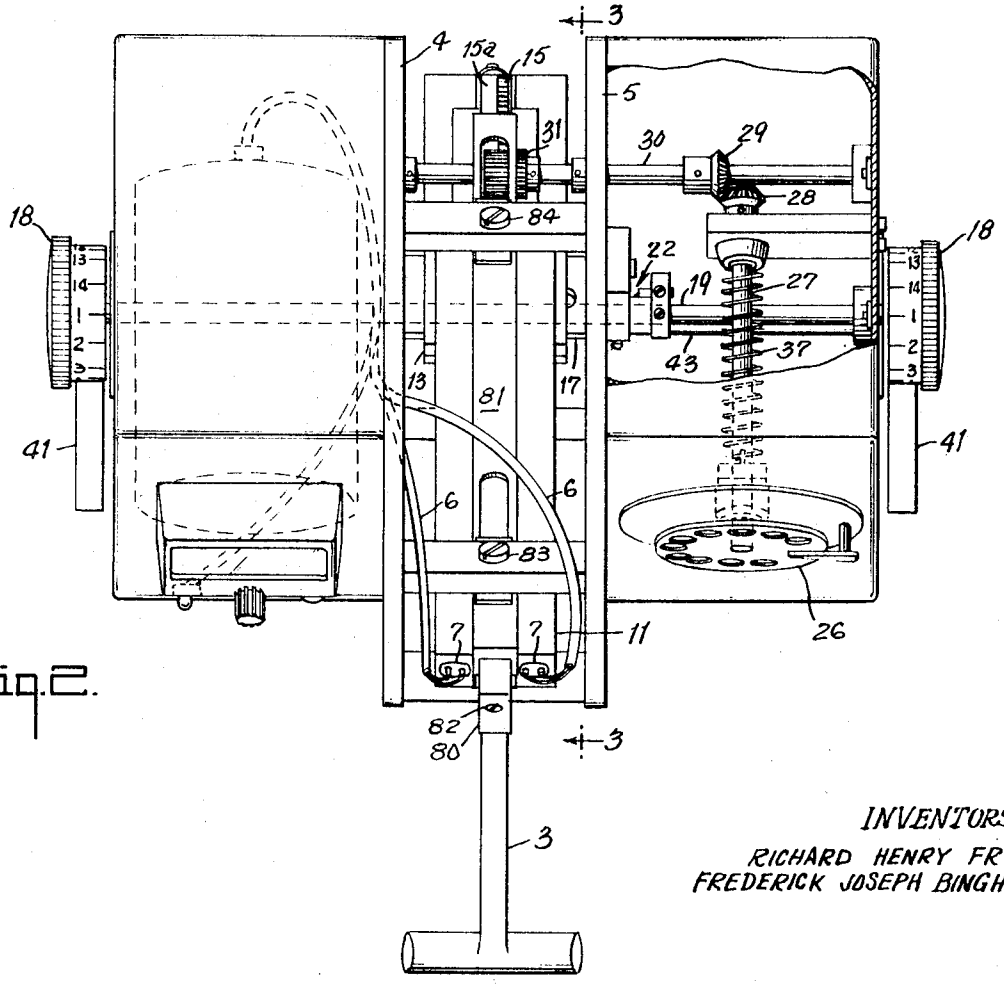


Fig. 2.

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Fig. 3.

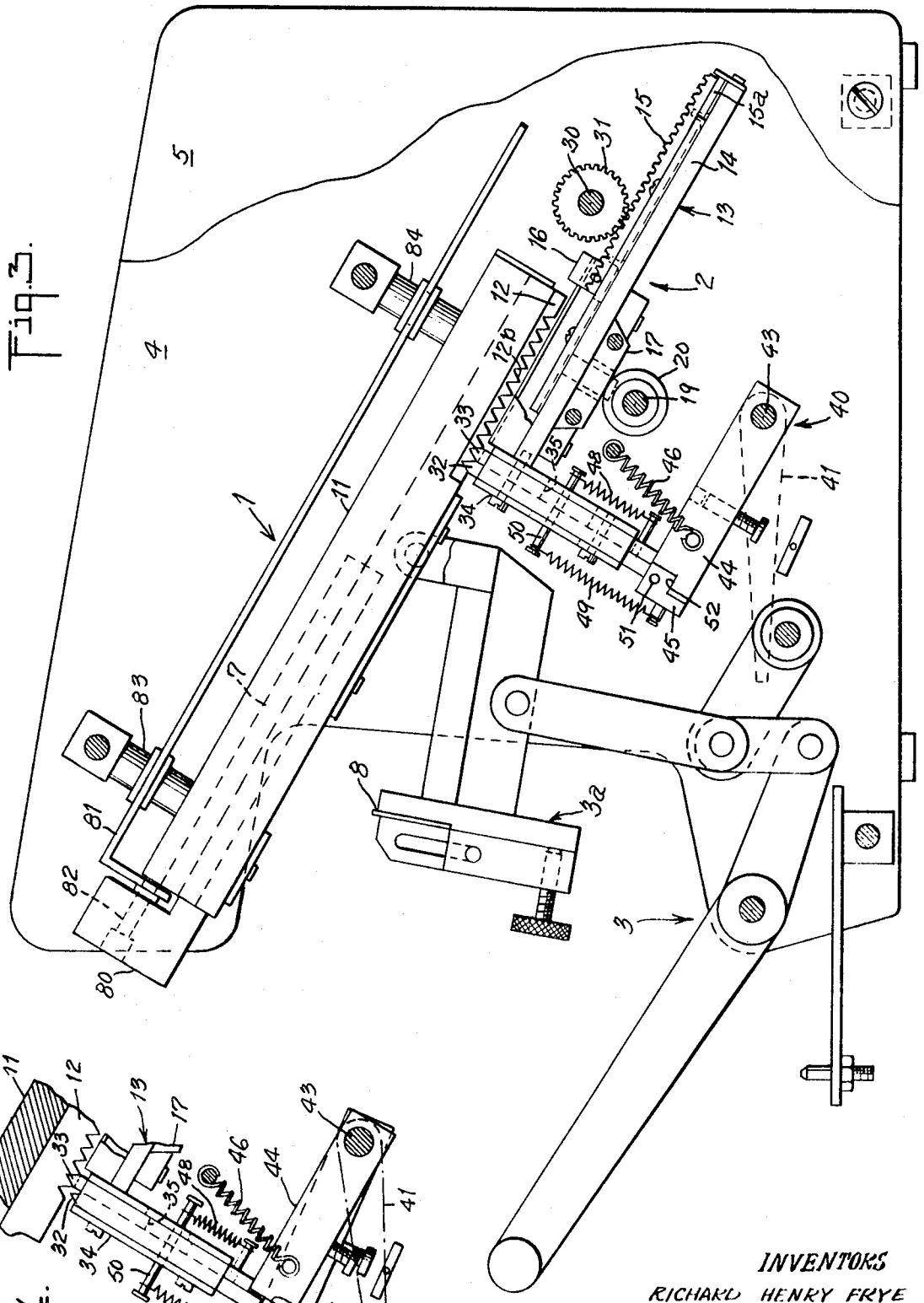


Fig. 4.

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Fig. 5.

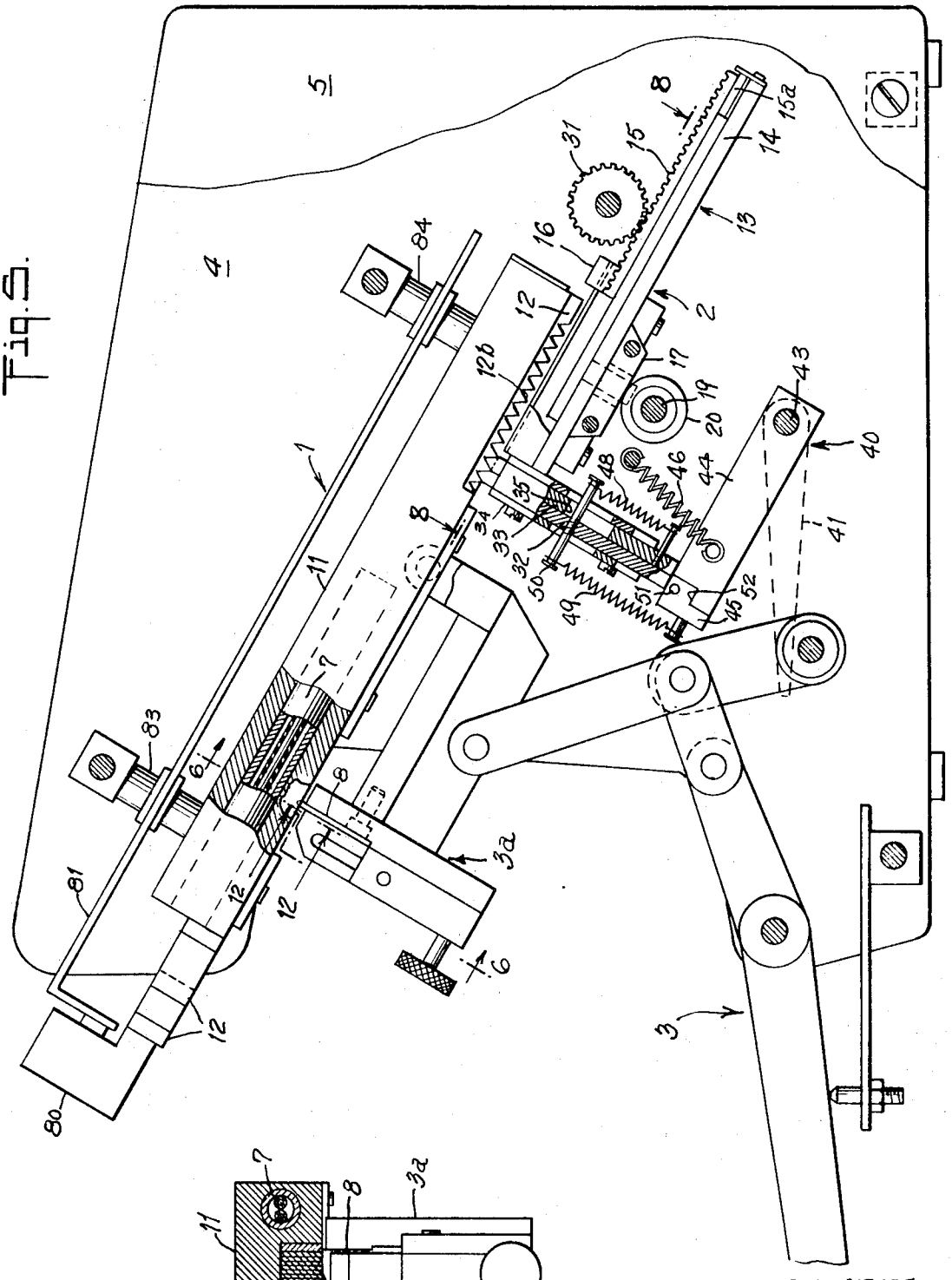
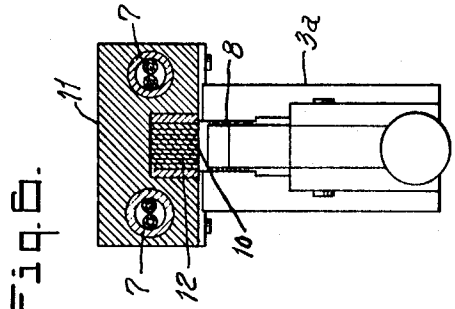


Fig. 6.



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Fig. 15.

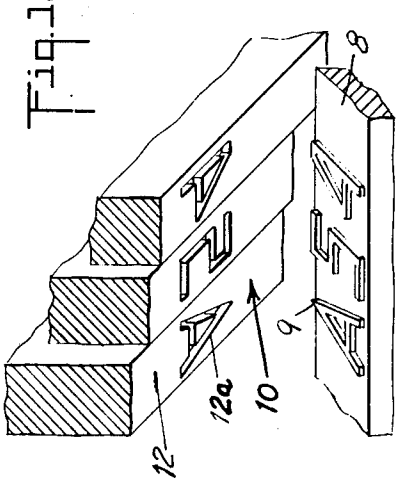


Fig. 7.

Fig. 16.

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Fig.8.

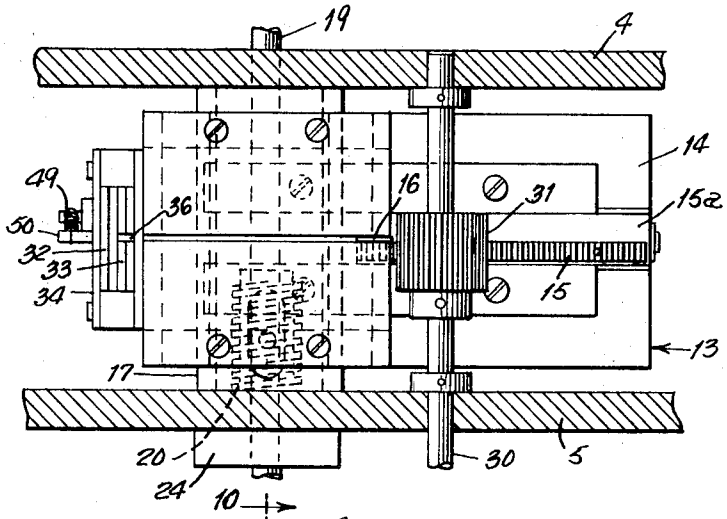


Fig.9.

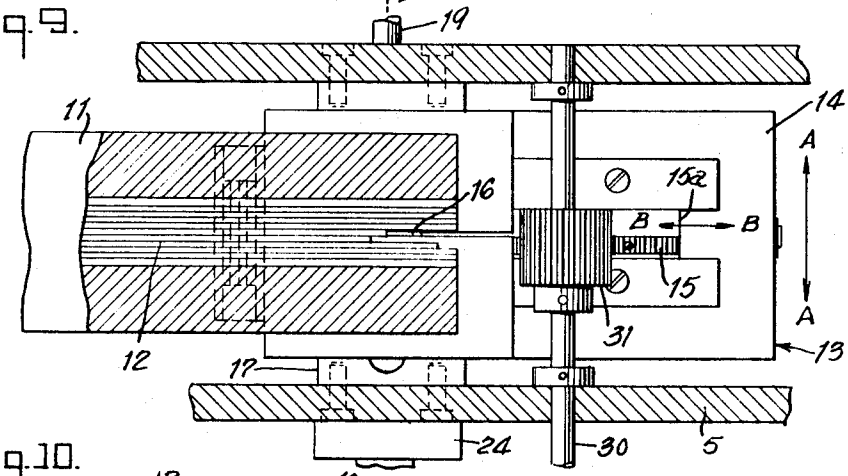


Fig.10.

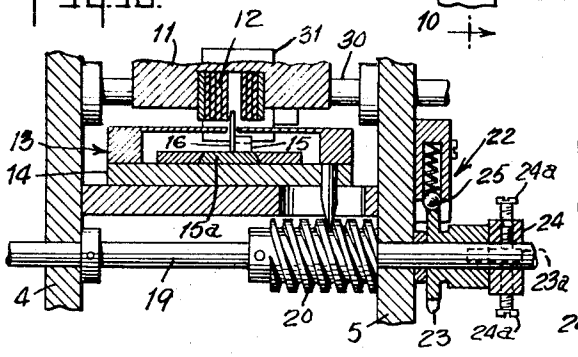


Fig.11.

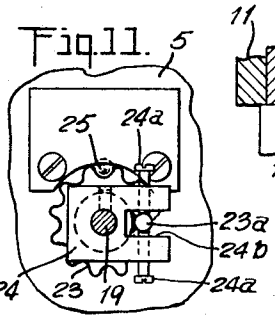
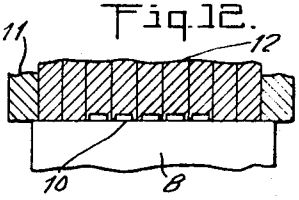


Fig.12.



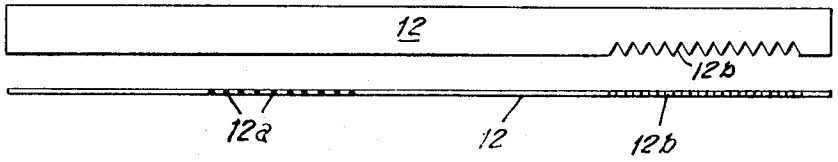


Fig.13.

Fig.14.

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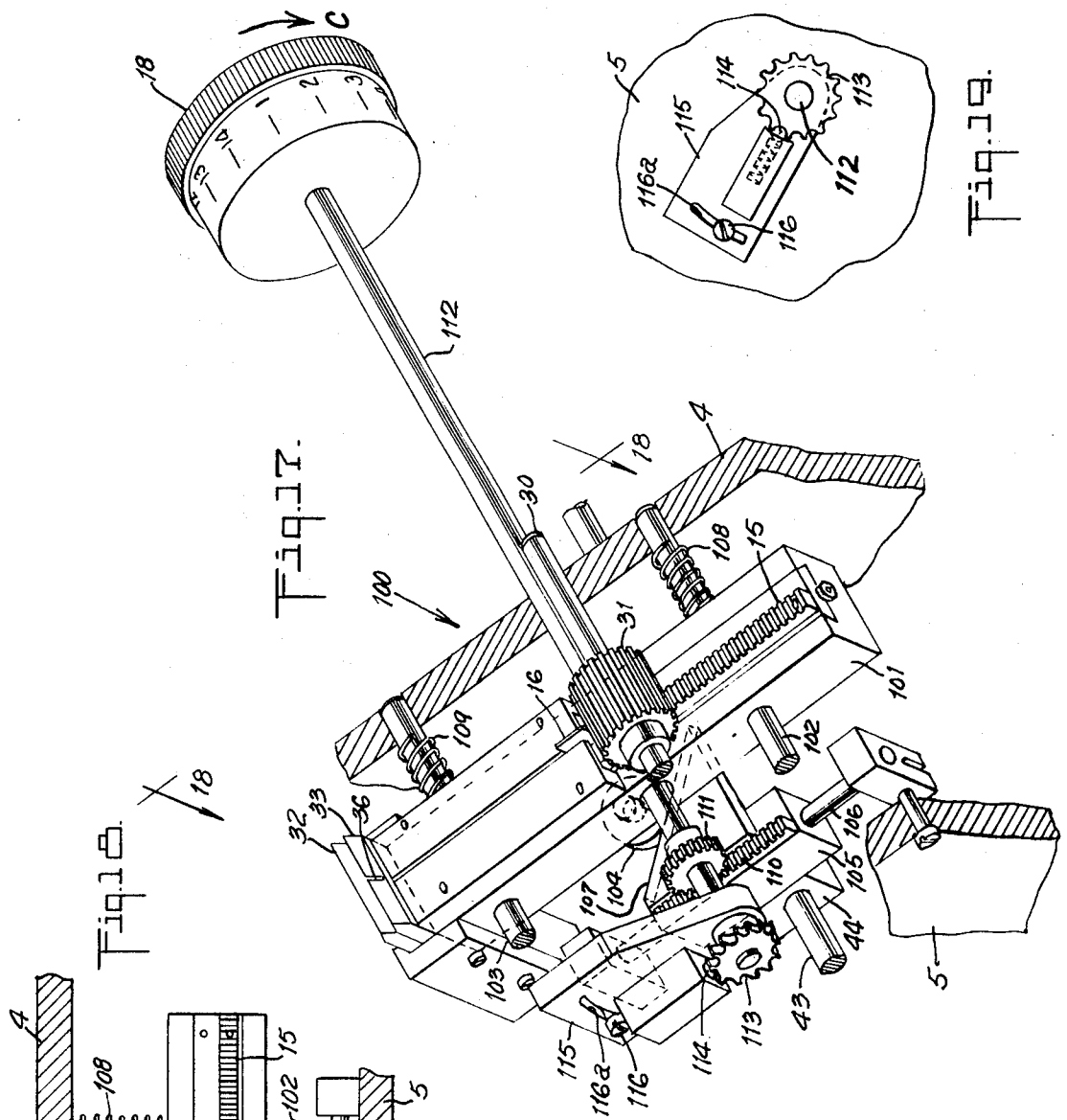


Fig. 17.

Fig. 19.

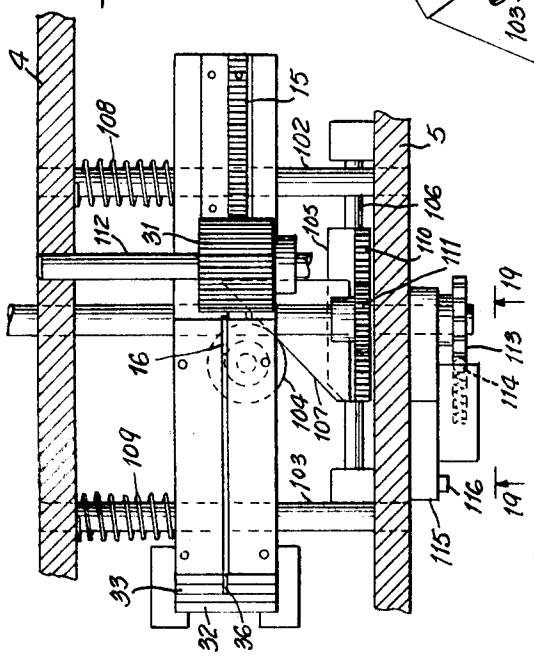


Fig. 18.

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APPARATUS FOR PRODUCING TYPE

This invention relates to apparatus for producing a bar or line of letterpress type characters, and more particularly relates to apparatus for rapidly and conveniently hot forming such typebars with desired character legends of less than 2 points in heights which are ready for immediate use.

The prior art discloses two general catagories of producing letterpress typebars (sometimes referred to as "slugs of type"), i.e. (1) machining, and (2) casting. In the machining technique, a blank typebar or slug has portions of one edge thereof carved, that is, cut away in a selected fashion whereby to leave the desired legend or printing characters in relief. This is time consuming, expensive and in most cases represents a skilled, manual operation requiring considerable dexterity. Generally, only one bar or line of type can be formed at a time and each succeeding piece takes as long to produce as the previous one. The second category involving the casting of such typebars generally comprehends the pouring of molten type metal into appropriate molds or forms and is suitable where there is a large, repetitive volume of production of the same character formation. Such casting processes require a substantial outlay of capital for molds, and the setup time for preparation of such molds and melt for pouring is extensive. In neither prior art technique can the character legend on the typebar be changed rapidly, or with ease.

The present invention overcomes these disadvantages of the prior art by providing apparatus by which typebars can be produced rapidly and relatively inexpensively providing means for selective character or format changes at will. The operator of the novel device herein disclosed can himself make these changes of type format without the need for employing skilled labor. Further, this invention reduces to a minimum any capital outlay requirements since neither machining nor casting equipment is necessary. Further economies are provided because of the rapid production rate from the apparatus of this invention in producing these typebars.

Generally this invention provides a device which includes among its various components a heated, engraved character matrix comprised of relatively movable matrix elements, with novel means for aligning selected ones of the characters into a desired legend, and then bringing the edge of a blank slug or typebar into forcible relation against the heated aligned matrix, resulting in a plastic displacement or deformation of type metal so as to form characters on the blank typebar in relief corresponding to the aligned matrix characters. The character matrix is comprised of a plurality of bars or elemental strips in slidable side-by-side relation, and whose adjacent edges form a substantially coplanar surface, and where each edge surface carries a plurality of engraved characters. The apparatus of this invention further features a novel indexing system which provides means for selectively sliding the individual bars or elemental strip members relative to one another whereby to transversely align a desired sequence of characters.

It is accordingly among the various objects of this invention to provide an apparatus for easily hot forming relief type characters on typebars.

It is another object of this invention to provide a type-forming apparatus in which the matrix alignment of characters for transfer to the blank typebar can be selectively changed by the operator.

It is still further object of this invention to provide an apparatus for easily and rapidly producing typebars in an inexpensive manner employing minimum labor skills and a relatively small capital investment.

These and other objects of this invention will become more apparent from the following description when taken in conjunction with the accompanying drawings in which:

FIG. 1 illustrates a front elevation view of the apparatus;

FIG. 2 illustrates a top plan view of FIG. 1 with a portion thereof broken away to view the interior thereof;

FIG. 3 illustrates a cross-sectional view of this apparatus taken on line 3–3 of FIG. 2;

FIG. 4 illustrates the indexing lock of FIG. 3 in the open or unlocked position;

FIG. 5 illustrates the mechanism of FIG. 3 with anvil portion carrying a blank slug into swagging position;

FIG. 6 shows a front elevation view of the anvil and slug taken on line 6–6 of FIG. 5;

FIG. 7 shows a perspective view of the lock lever system;

FIG. 8 shows a plan view of the rack and pinion and related portions taken on line 8–8 of FIG. 5;

FIG. 9 shows the general view of FIG. 8 with matrix bars and relative movement therebetween illustrated;

FIG. 10 illustrates an enlarged detail cross section taken on line 10–10 of FIG. 9;

FIG. 11 illustrates a side elevation view of the detent mechanism of FIG. 10;

FIG. 12 illustrates a cross-sectional view taken one line 12–12 of FIG. 5;

FIGS. 13 and 14 illustrate an elevation and bottom edge view, respectively of an engraved matrix element;

FIG. 15 schematically shows an enlarged perspective partial view of the engraved matrix as it separates from a completed slug of type;

FIG. 16 illustrates an enlarged perspective view of a typical typebar produced by this invention;

FIG. 17 illustrates a perspective view of an alternate form of indexing mechanism;

FIG. 18 illustrates a plan view taken on line 18–18 of FIG. 17; and

FIG. 19 shows in enlarged detail an elevation view of the detent mechanism of FIG. 18.

Referring now with greater particularity to FIGS. 3 and 5 of the drawings, the apparatus of this invention is generally comprised of two main portions, i.e. a heated coplanar matrix 1 comprised of elemental strips with engraved character forms on the edge portions of these strips and against which a blank typebar or slug 8 held in anvil 3*a* is forcibly pressed by a conventional toggle movement 3; and an indexing mechanism generally designated 2 for arranging the elemental strips with respect to one another so as to selectively align the character forms into a desired legend for transfer to the blank type slug.

Referring to FIG. 16, this invention is concerned primarily with apparatus for rapidly producing successive typebars 8, with any desired arrangement of relief characters 9 integrally formed on one edge portion thereof. Such a typebar (sometimes referred to as a "type slug" or "line-of-type") is produced in accordance with this disclosure by forcibly pressing a metallic typebar blank 8 of typical lead-tin composition against a heated, selectively indexed, engraved surface 10, shown in FIGS. 5, 6, and 15. This invention further contemplates that when the typebar blank is brought into contact with engraved surface 10, formed of previously arranged characters into the desired legend by means hereinafter described, the typebar surface to be deformed, because of the almost instantaneous heat transfer to it from heated engraved surface 10, will attain a plastic characteristic so as to be easily deformed into conformance with the aligned engraved recesses of surface 10. As shown in FIGS. 5 and 6, the engraved surface 10 which will be referred to as the character matrix is maintained at a prescribed temperature level by the use of conventional electric heater coils 7 mounted in the channel-type magazine 11 which carries the matrix elements 12 in slidable relation to each other, and connected to a suitable power source (not shown) by conductors 6. Desired temperature levels may be maintained by employing heat regulators in a manner well known in the art. In the case of typebars made from conventional type metal compositions of lead-tin, a matrix temperature range of 275° to 300° is necessary.

The engraved surface or character matrix 10, shown in enlarged perspective view in FIG. 15, is comprised of a plurality of matrix elements or bars 12 in contiguous side-by-side slidable relation, each bar bearing a series of uniformly spaced en-

graved characters 12*a* along its longitudinal edge, as shown. For purposes of this disclosure, each such engraved bar will be referred to as matrix element 12 shown in FIGS. 13, 14, and 15, having engraved characters 12*a* at its forward portion, and serrations 12*b* at its rear portion; and the composite of a plural number of such elements in their assembled form will be referred to as the character matrix 10. It should be noted, at this point, that by slidably positioning the matrix elements relative to one another, any desired combination of adjacent characters may be aligned in transverse colinear relation at the point where the typebar blank comes in contact therewith. The proper selection and aligning of matrix elements is accomplished by the indexing means of this invention, hereinafter described.

Referring now to FIGS. 5 and 9, there is shown in enlarged detail a side elevation and a partial top plan view of the apparatus of this invention showing the indexing mechanism generally designated 2, and the rear portions of the matrix elements 12 carried between wall portions 4, 5 of the device. Flatbed 13 comprised of plate 14, rack 15, and pusher bar 16 are adapted for traversing motion in direction A–A (FIG. 9) on slide 17. Slide 17 is held rigidly in place between wall portions 4 and 5. As shown in FIG. 2, index wheels 18 are fixedly mounted on the ends of a common shaft 19. Referring to FIG. 10, shaft 19 also carries fixed thereto a worm gear 20 which is engaged within its thread portion by probe 21 fixedly mounted to plate 14. Thus, as shaft 19 is driven by either of index wheels 18, worm gear 20 is also revolved thereby driving probe 21 and resulting in a traversing of flatbed 13 and its associated parts including plate 14 in the A–A direction of FIG. 9.

As seen in FIGS. 10, 11, there is shown a conventional detent mechanism generally designated 22 comprised of a sprocket wheel 23 rotatably mounted on shaft 19, and a resiliently biased ball 25 mounted on the frame wall 5 adapted to travel in and out of engagement with sprocket 23 as it is rotated. The sprocket teeth increments are designed so that one incremental movement of a sprocket tooth past ball 25 corresponds to a movement in the A–A direction (see FIG. 9) of the pusher bar 16 from its aligned position behind one matrix element, to an aligned position behind another matrix element. Fixed to the hub of sprocket 23 is a pin 23*a* which projects into the slot 24*b* and is positioned between screws 24*a* of block 24 which is fixedly mounted on shaft 19. Thus by positioning sprocket 23 with screws 24*a*, the location of pusher bar 16 can thus be adjusted.

The forward or backward movement, i.e. direction B–B of any matrix element for desired character alignment is accomplished by aligning pusher bar 16 behind a given matrix element and pushing it against that particular matrix element for a predetermined distance. As seen in FIGS. 2 and 9, index dial 26 is fixedly mounted on rotatable shaft 27 so that a rotation of index dial 26 is transferred from shaft 27 and coacting cone gears 28, 29 to shaft 30, and in turn to pinion 31 which in turn drives rack 15 and connected pusher bar 16, both mounted on slidable support plate 15*a*, forward resulting in the movement of a selected matrix element since the dial character corresponds to a similar character engraved on the matrix elements. The distance index wheel 26 is turned of course determines the linear distance pusher bar 16 travels. The markings adjacent wheel 26 corresponds to the engraved character to be positioned over the anvil preparatory to striking a typebar. Whether the resultant character will be a letter or number depends obviously on whether the character matrix is composed of letters or numbers, or combinations thereof, depending on the needs of the user. Spring member 37 acts as a resilient bias on the index wheel so as to return it to its set point following each rotational movement. Thus it should now be obvious, in light of the foregoing description, that by sequential movements of index wheels 18, and 26, pusher bar 16 is intermittently aligned and driven forward so as to move any given matrix element 12 into position for character alignment thus forming the desired legend.

In order to provide that degree of accuracy of alignment which is necessary in positioning the various matrix elements, this invention additionally features novel locking and positioning means for use in fixing the various positions of the matrix elements during the alignment of characters in forming the desired legend. In FIGS. 3, 4, and 7 there are shown two locking bars 32 and 33 in side-by-side slidable relation. Each of these locking bars terminates, at its upper end portion in an angular configuration which coacts in an interlocking relation with the correspondingly shaped recesses or serrations 12*b* at the rear portions of the matrix elements. These serrations are spaced apart a distance corresponding to the spatial relation between the engraved characters. Since both of these locking bars 32 and 33 are connected to flatbed 13 by fastening members 34, they also traverse in the A–A direction with the flatbed upon actuation of index wheels 18. Referring to FIG. 7, it can be seen that the top edge of lock bar 33 carries a slot 36 which is in alignment with pusher bar 16. Since the pusher bar and locking bars are fixed to the flatbed 13 and traverse with it in direction A–A when index wheel 18 is rotated, slot 36 will at all times remain aligned with pusher bar 16 for reasons hereinafter disclosed.

Referring more particularly to FIG. 7 there is shown in enlarged perspective view the lever release mechanism generally designated in FIG. 3 by numeral 40. The lever handles 41, also shown in FIGS. 1 and 2, are rigidly attached to shaft member 43, one at each end thereof. Intermediately located on this shaft are a pair of lock levers 44 and 45. Lock lever 45 is fixed to shaft 43 by set screw 39 or other means and lock lever 44 is journaled on shaft 43 with a running fit. As seen in FIGS. 3, 5, and 7, the base end of lock bar 32 is carried by lock lever 44, and the base end of lock lever 33 is carried by the surfaces of both lock levers 44 and 45. Spring means 46 and 47 bias lock levers 44, 45, respectively, in an upward direction so as to keep the upper end portions of lock bars 32, 33 engaged in the serrations 12*b* of the matrix elements 12. Spring means 48 and 49 have their lower ends connected by pins or other means respectively to lock bar 33 and lock lever 45. The upper portions of these two springs are connected to a common stud 50 securely fastened through lock bar 32. Note that lock bar 33 is recessed at 35 in order that stud 50 is in no way connected thereto. This locking mechanism, accordingly, operates as follows: When it is desired to slidably position any one of the matrix elements 12 relative to one another, lever 41 is depressed until pin 51 on lock lever 45 engages stop surface 52 of lock lever 44. This motion has the effect of disengaging only locking bar 32 from all of the matrix elements, though still leaving locking bar 33 in engagement with the serrations 12*b* of all the matrix elements 12, except for that matrix element which passes through slot 36 of lock bar 33, and which is also aligned with push bar 16. Thus, by simply depressing lever 41 until pin 51 engages stop surface 52, the desired matrix elements can be axially moved into desired position, i.e. by dialing the desired character on dial index 26, pusher bar 16 will advance the selected matrix element to the desired position. Lever 41 is then released thereby locking with all matrix elements, and index wheel 18 can then be rotated to the next position, which will effectively align pushrod 16 with another matrix element while simultaneously retaining the remaining matrix elements in fixed position. Again, by depressing lever 41 to its first position, i.e. pin 51 against stop surface 52, this will disengage lock bar 32 from the serrations 12*b* of all matrix elements thereby freeing the matrix element in alignment with pusher bar 16 and its position can be dialed by actuating dial index 26. Thus it can be seen that by these sequential steps all of the matrix elements can be set into a desired position relative to one another to align certain of their engraved characters into legend form.

If it is desired to return all matrix elements to their original rearward position, lever 41 is depressed beyond the first stop position, i.e. beyond the point where pin 51 initially engages stop surface 52 thereby moving pin 50 down the entire length of recess 35 until it comes into abutting relation with lock bar

33. Continued movement of lever 41 will then have the effect of additionally disengaging lock bar 33 from the matrix element serrations, whereby finger pressure at the front or outboard end of plunger 80 will push against the matrix elements sliding them all to their rearward position. As seen in FIG. 3, plunger 80 is fastened to a support rod 81 by screw 82. Support rod 81 is slidably carried by support posts 83, 84 and is free to slide outwardly when pushed by any of the matrix elements 12 as they are oriented.

Referring to FIGS. 17, 18, 19, there is illustrated another embodiment of an indexing mechanism designated generally 100 and carried, as is the previously described embodiment, within the frame walls 4 and 5. This indexing mechanism is generally comprised of a support block 101 adapted for slidable lateral movement on rod members 102, 103. Supported from beneath block 101 is a rotatable bearing member 104 adapted for rolling contact against inclined surface 107 of actuator block 105. Block 105 is slidably carried on rod 106 and adapted therefore to move in a direction substantially at right angles to the lateral movement of block 101. Resilient biasing of block 101 by spring members 108, 109 will assure constant bearing contact of roller bearing 104 and inclined surface 107. Block 101 carries on its top surface a rack 15 which is engaged by pinion 31 fixedly carried by shaft 112, which in turn carries at its distal end an index wheel 18. The other end of shaft 112 carries a sprocket member 113 operatively coacting with a spring biased ball 114 in conventional detent relation, more clearly illustrated in FIG. 19. Detent block 115 has one end pivotally supported in running fit relation on shaft 112, and the other end adjustably held in position against the frame wall by screw 116, through slot 116*a*.

In the embodiment of FIG. 17, sprocket 113 is rigidly secured to shaft 112. If screw 116 is loosened, any pivotable adjusting of block 115 around shaft 112 will, since detent ball is firmly engaged with sprocket 113, have the effect of rotating shaft 112 resulting in a corresponding lateral movement of pusher bar 16. Thus, proper alignment of pusher bar 16 with the matrix bars 12 carried in the magazine can always be maintained.

This embodiment operates as follows: Rotation of index wheel 18 in direction of arrow C in turn rotates pinion 111 and accordingly drives actuator block 105 forward. This motion directs a force from surface 107 against roller bearing 104 which in turn overcomes the biasing force of springs 108, 109 and accordingly moves block 101 laterally along its support rods 102, 103. As in the previously described embodiment of the indexing mechanism, the sprocket teeth increments corresponding to the numbers on index wheel 18 are designed so that one incremental movement of a sprocket tooth past ball 114 corresponds to a movement of pusher bar 16 from its aligned position behind one matrix element to a position behind another matrix element. Accurate alignment between pusher bar 16 and the matrix elements is made by adjusting block 115 as hereinbefore described. Dial member 26 and shaft 30 coact with pinion 31 and rack 15 also as previously described.

Though this invention has been disclosed in terms employing metal composition typebars, it should be obvious from the foregoing that other materials may also be employed, as for example, plastics, the only requirement being that the heat from the matrix surface be transferred quickly enough on contact with the blank typebar so that the typebar material will attain a sufficiently plastic condition to conform with the engraved recesses of the matrix. The matrix temperature must of course depend on the nature of the typebar material being employed and may easily be determined by experimentation and/or evaluation of the material characteristics.

It will be understood that various changes in the details, materials, setups, and arrangements of parts which have been herein illustrated in order to explain the nature of the invention may be made by those skilled in the art within the principle and scope of the appended claims.

We claim:

1. Apparatus for forming relief characters on a typebar comprising:

a. a frame member;

b. a temperature-controlled matrix of engraved characters carried by said frame member, wherein said matrix of engraved characters comprises

c. a plurality of bar elements in contiguous, relatively slidable, side-by-side relation, adjacent edge portions thereby forming a substantially coplanar surface;

d. each bar element defining a forward and rear end portion;

e. said coplanar surface exhibiting a plurality of spaced-apart engraved characters along a portion of the longitudinal edge of each adjacent bar element;

f. means securing the relative positions of the bar elements, wherein said means comprises

g. a plurality of serrations at the rearward portions of each bar element;

h. a first and second lock bar means in relative slidable side-by-side relation;

i. means resiliently biasing said first and second lock bar means in coacting, engaging relation with the aforesaid serrations of each bar element;

j. means carried by said frame and operably connected to said lock bar means for selectively disengaging the first and then the second lock bar means in sequence from said serrations;

k. means for selectively positioning a line of said characters; and

l. means carrying a deformable, blank typebar into coacting relation against said character matrix causing a plastic deformation of the typebar in conformance with the engraved characters contacted thereby.