

MACHINE FOR CASTING AND COMPOSING TYPE BODIES.

47 SHEETS--SHEET 1.

E. B. BARBER.

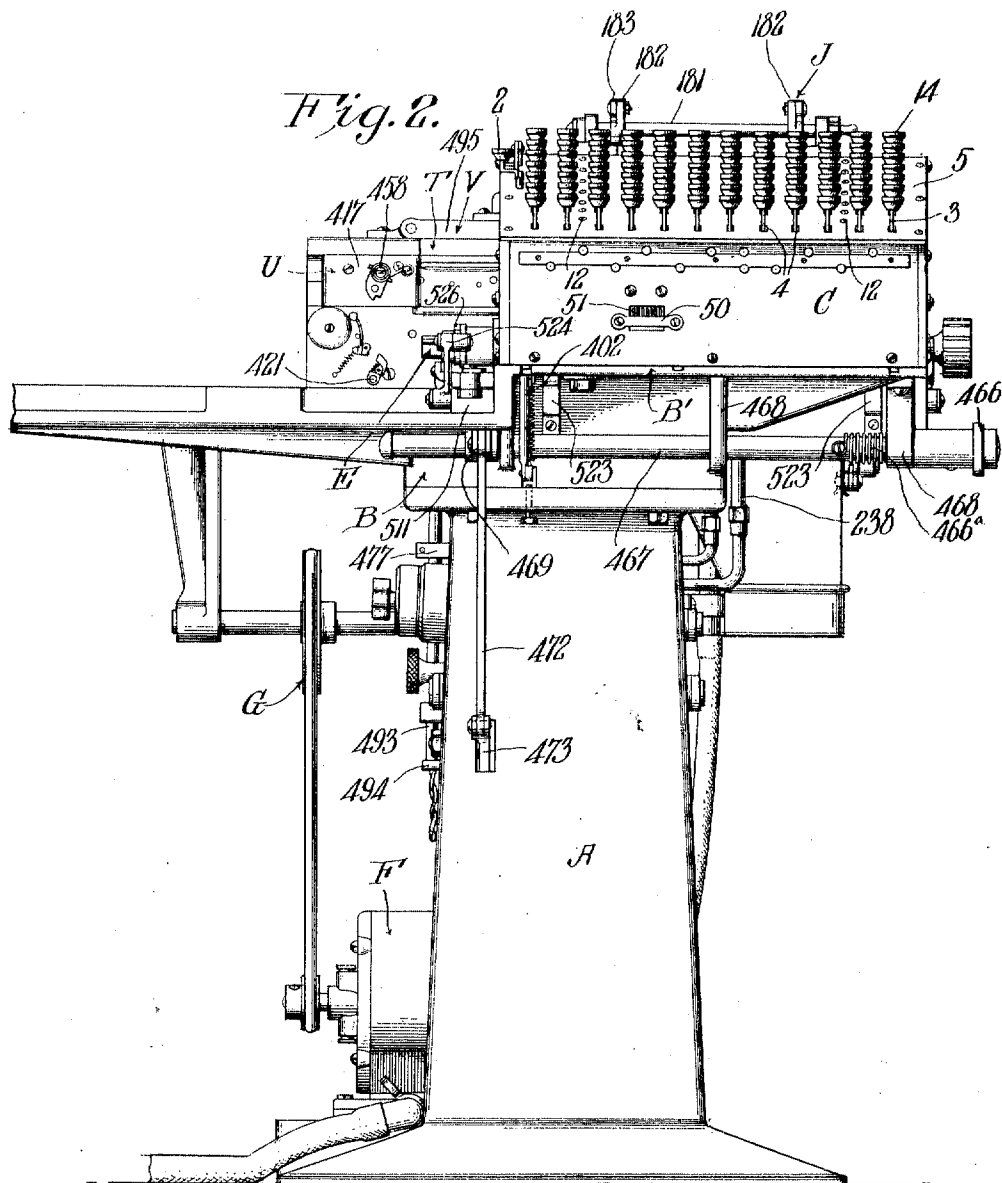
MACHINE FOR CASTING AND COMPOSING TYPE BODIES.

APPLICATION FILED MAR. 2, 1909. RENEWED SEPT. 16, 1910.

1,002,212.

Patented Sept. 5, 1911.

47 SHEETS—SHEET 2.



Inventor

Ernest B. Barber

Witnesses

C. E. Smith.

H. C. Bolinette.

By

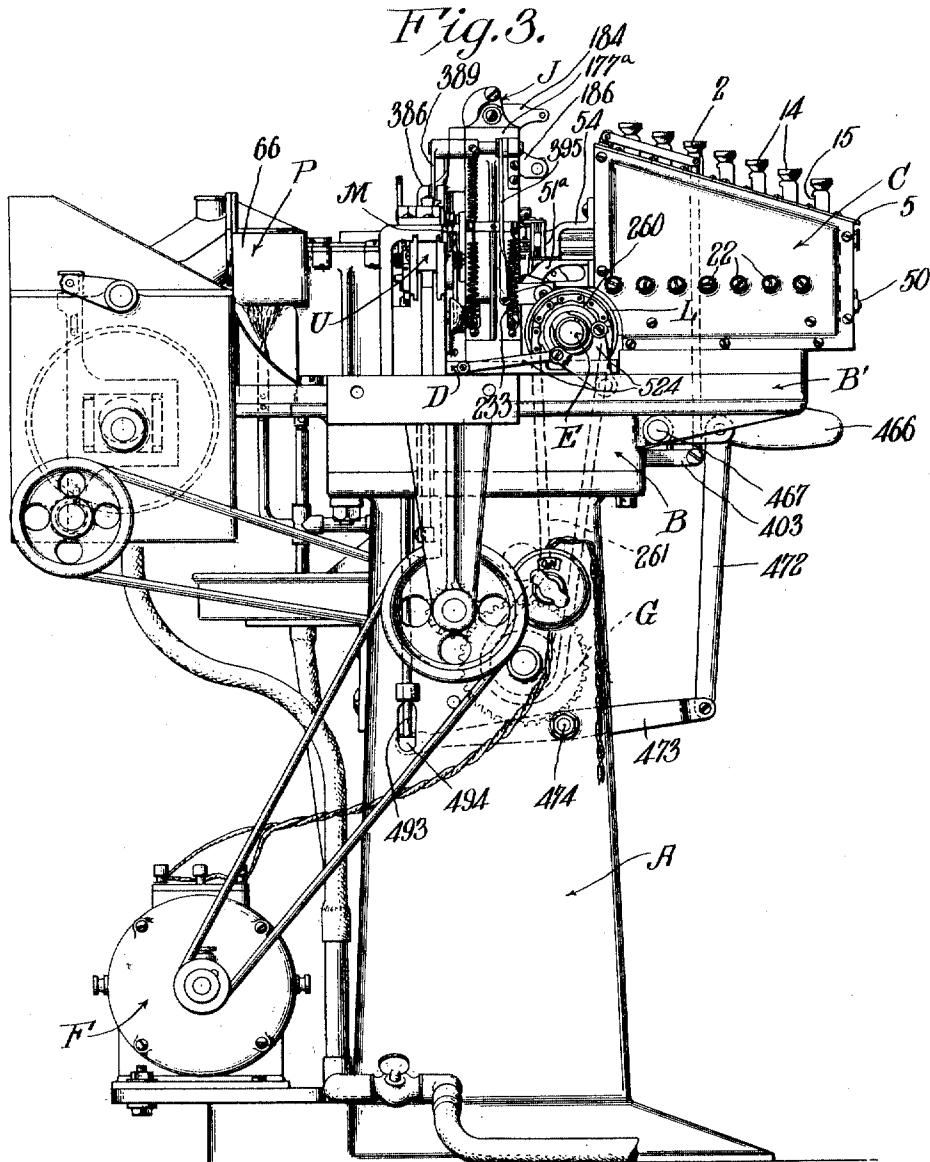
Charles H. Smith

Attorney

E. B. BARBER.
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1,002,212.

Patented Sept. 5, 1911.
47 SHEETS—SHEET 3.



Inventor

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Witnesses
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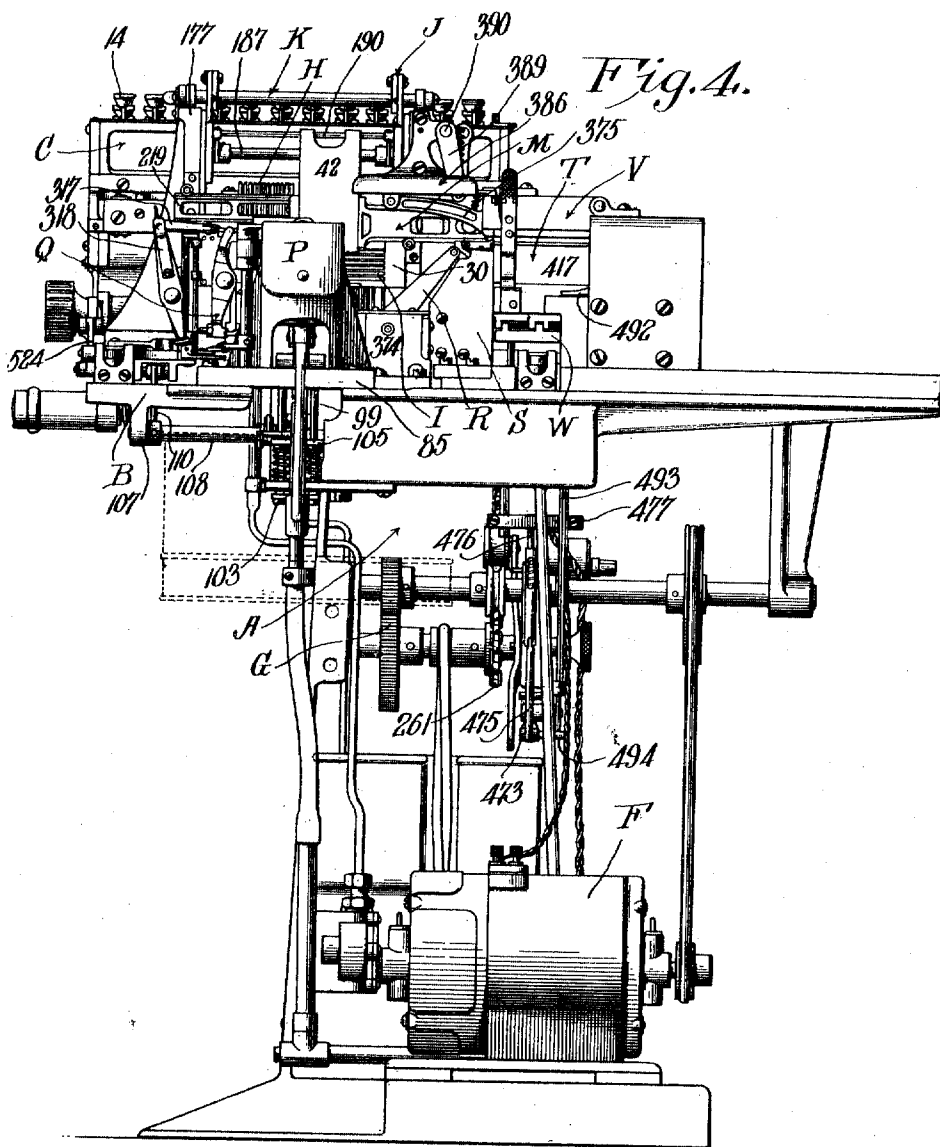
Attorney

E. B. BARBER.
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1,002,212.

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47 SHEETS-SHEET 4.



Inventor
Ernest B. Barber

By *Chas. H. Riches*

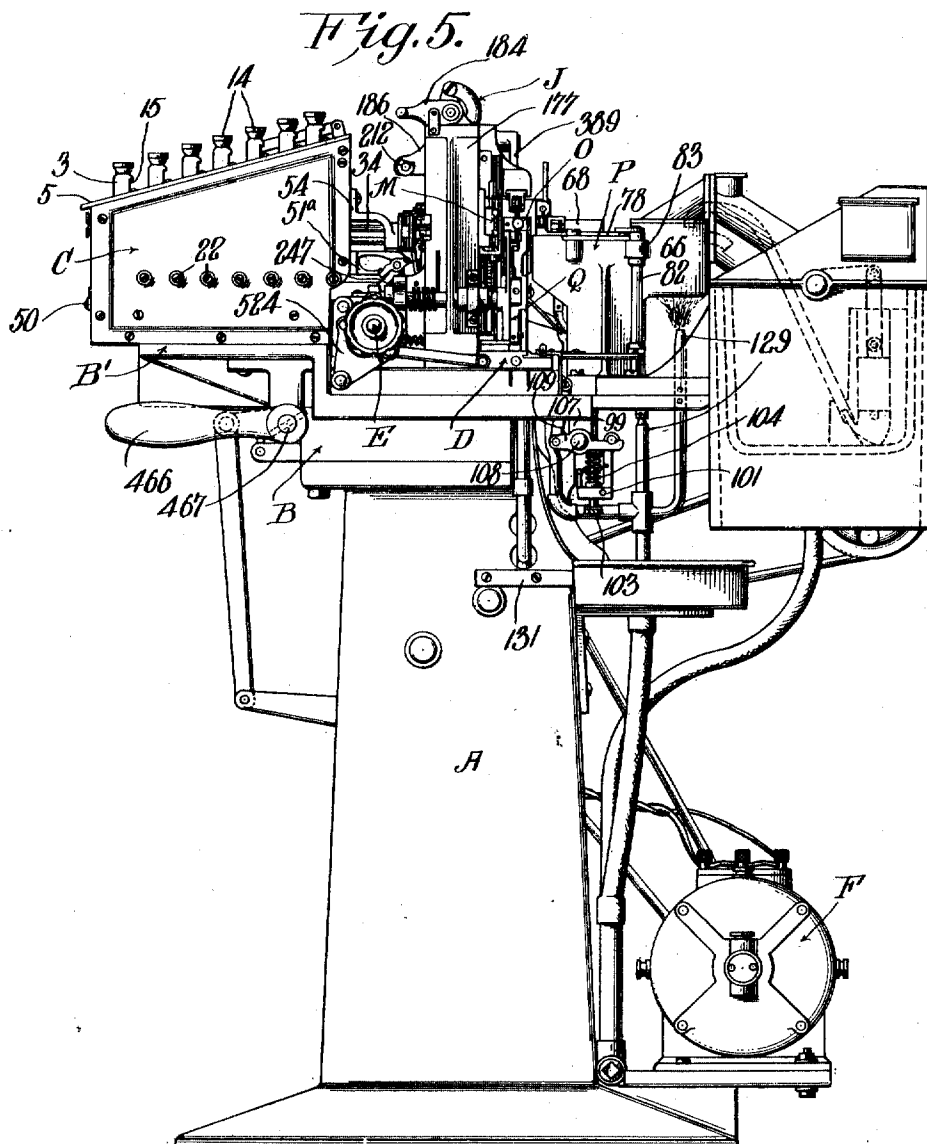
Attorney

Witnesses
C. E. Smith
H. C. Robinson

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 MACHINE FOR CASTING AND COMPOSING TYPE BODIES.
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1,002,212.

Patented Sept. 5, 1911.
 47 SHEETS—SHEET 5.



Witnesses
C. E. Smith.
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Inventor
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 334 *Chas. H. Reindes*
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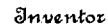
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47 SHEETS--SHEET 6.



APPLICATION FILED MAR. 2, 1909. RENEWED SEPT. 16, 1910.

47 SHEETS—SHEET 7.



Chas H Riches

Attorney

Witnesses

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 47 SHEETS—SHEET 8.

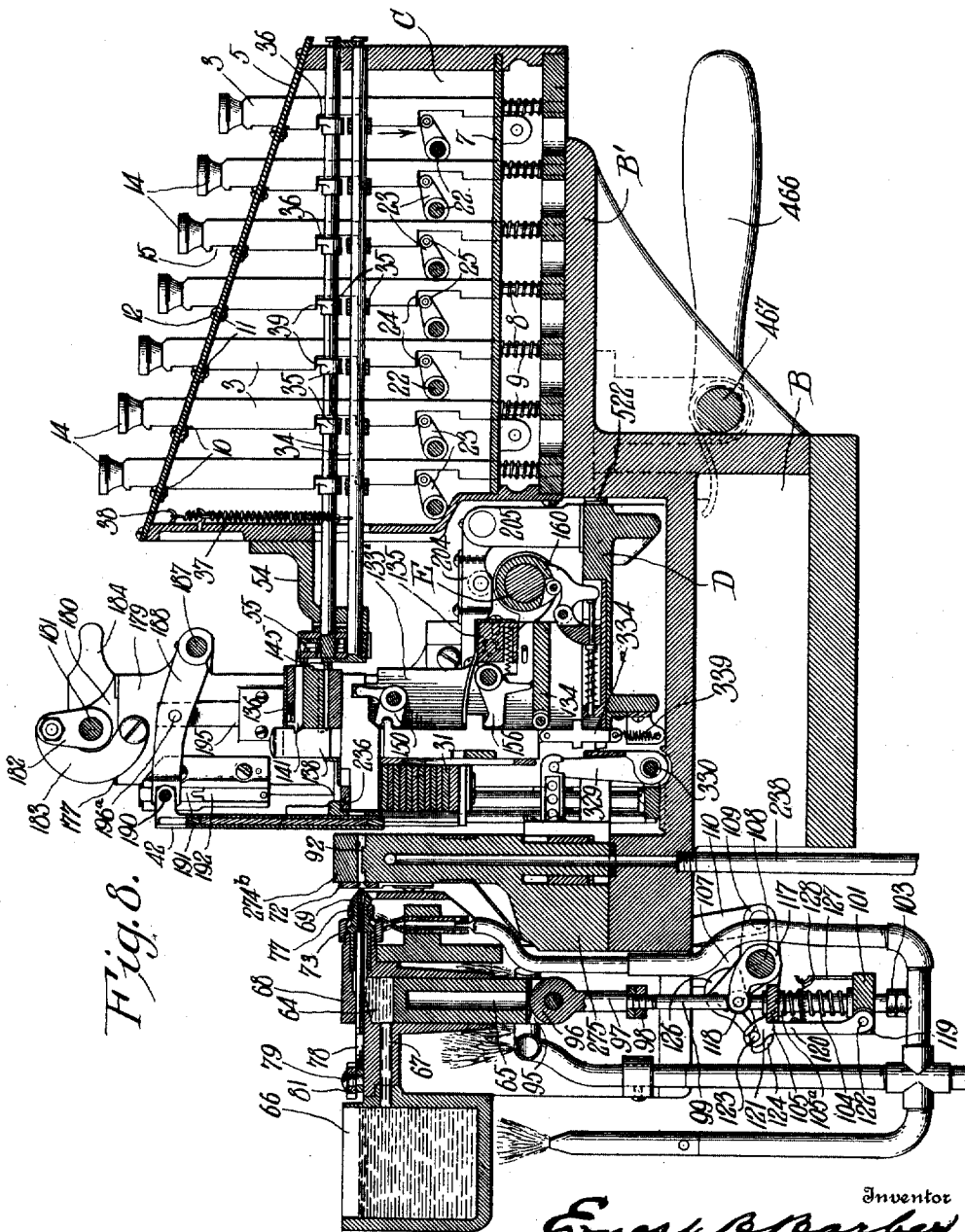


Fig. 8.

Witnesses
C. C. Smith
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47 SHEETS—SHEET 9.

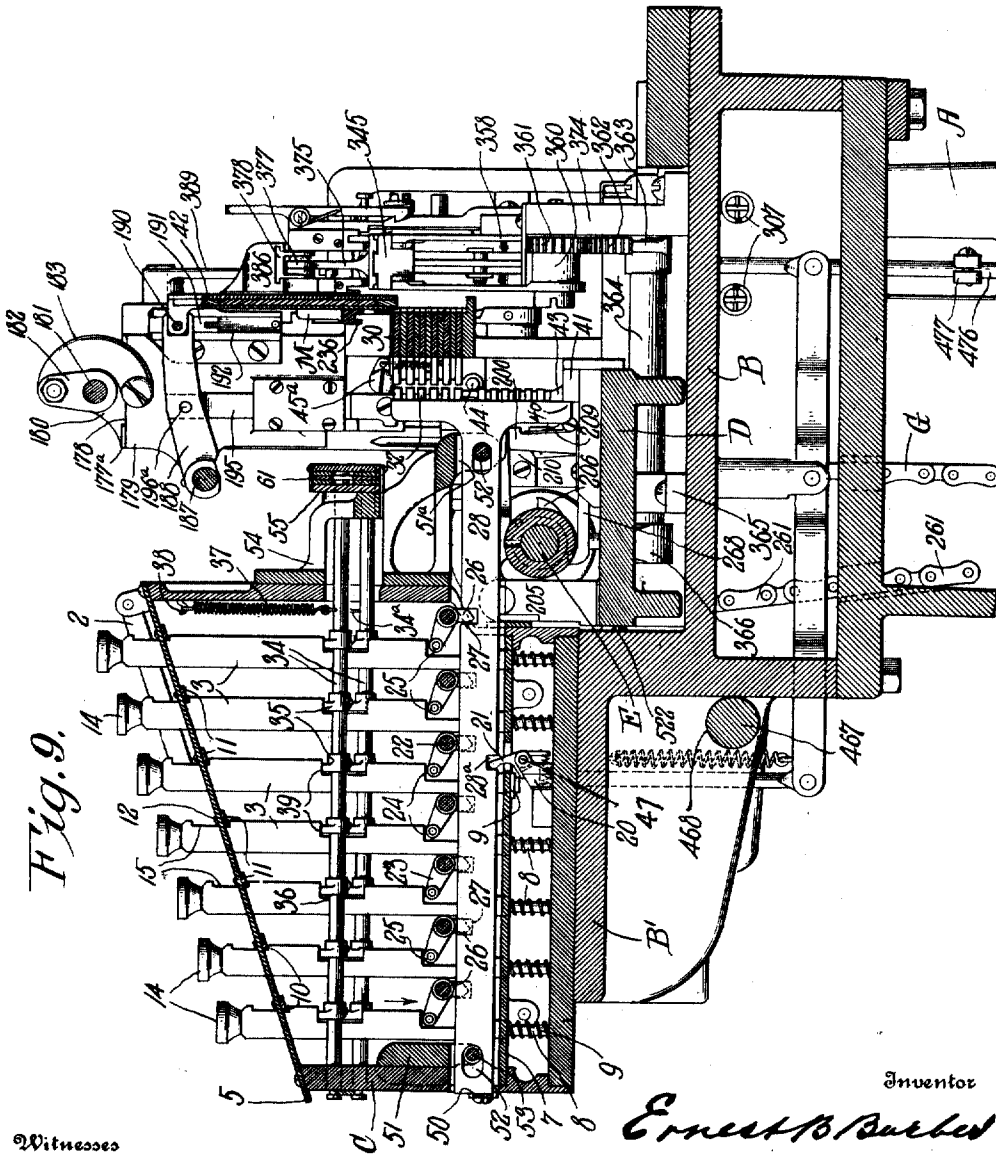


Fig. 9.

Witnesses

C. E. Smith.
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MACHINE FOR CASTING AND COMPOSING TYPE BODIES.

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Patented Sept. 5, 1911.

47 SHEETS—SHEET 10.

Fig. 10.

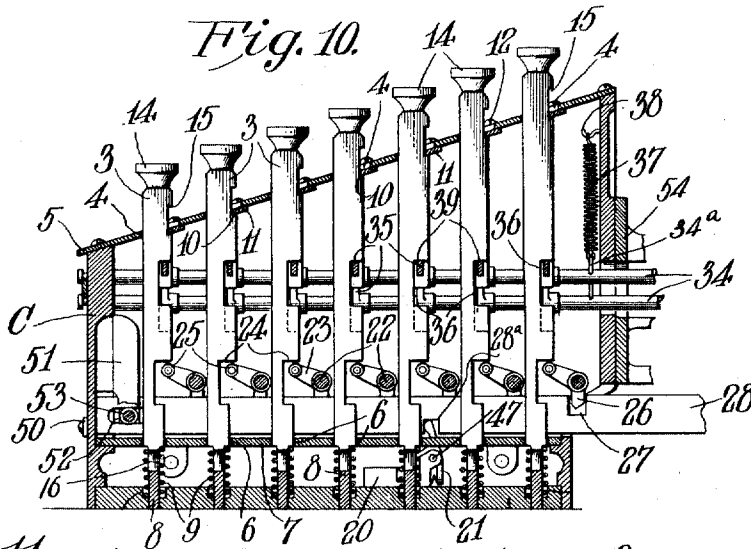
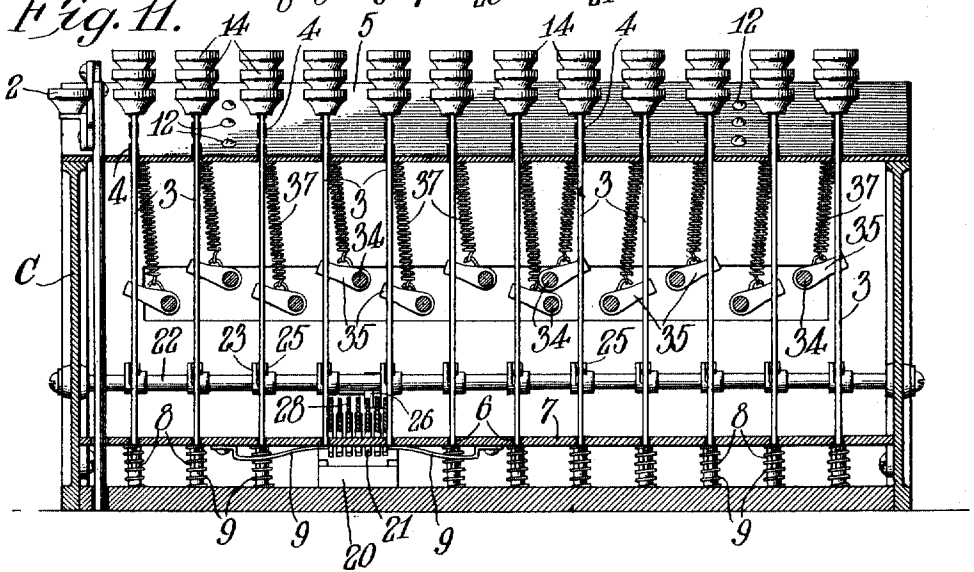


Fig. 11.



Witnesses

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47 SHEETS—SHEET 11.

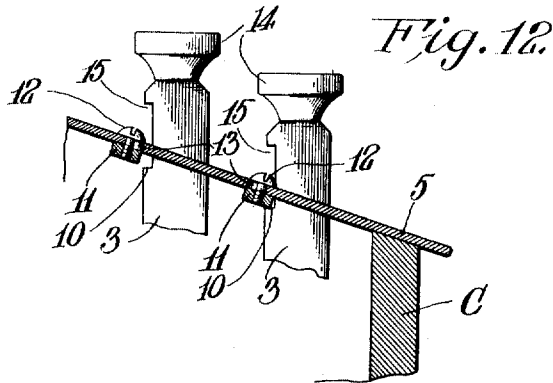


Fig. 12.

Fig. 13.

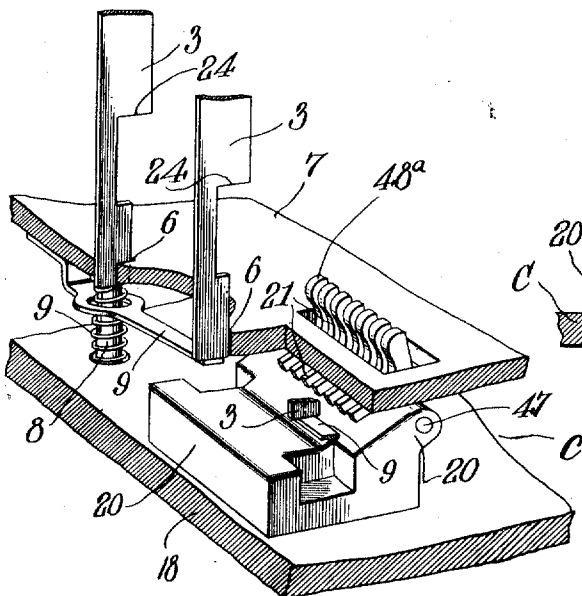


Fig. 14.

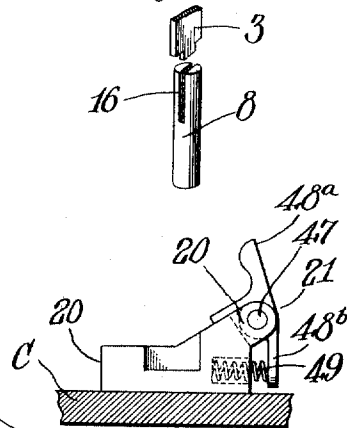


Fig. 13a.

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H. C. Schmitt.

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47 SHEETS—SHEET 12.

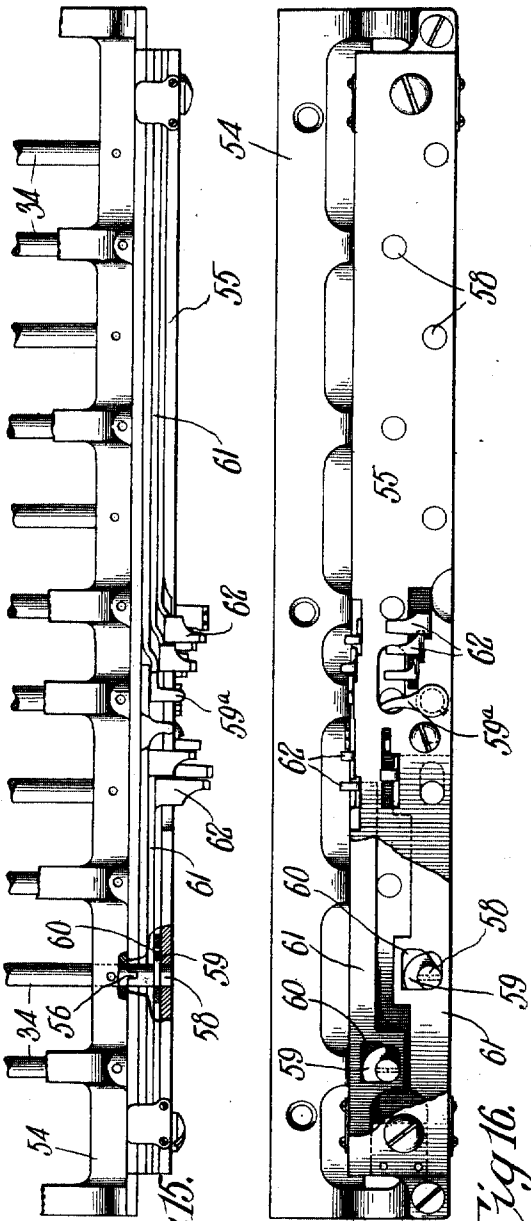


Fig. 16.

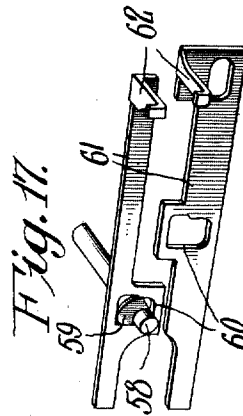


Fig. 17.

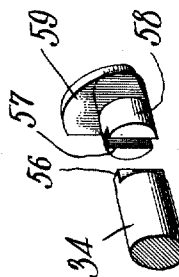


Fig. 18.

Witnesses
C. C. Smith
H. L. Blum

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Inventor

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MACHINE FOR CASTING AND COMPOSING TYPE BODIES.
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C. E. Smith.
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Patented Sept. 5, 1911.
47 SHEETS-SHEET 14.

Fig. 22.

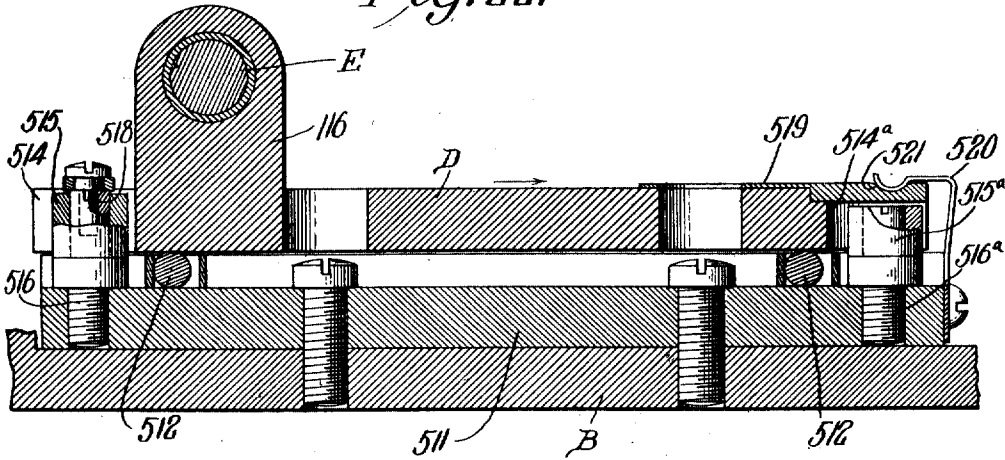
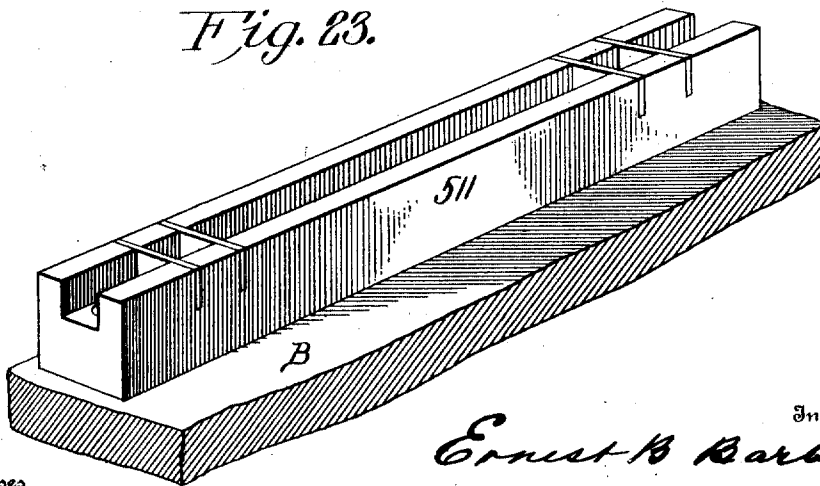


Fig. 23.



Witnesses

C. E. Smith,
W. L. Robinson

Inventor

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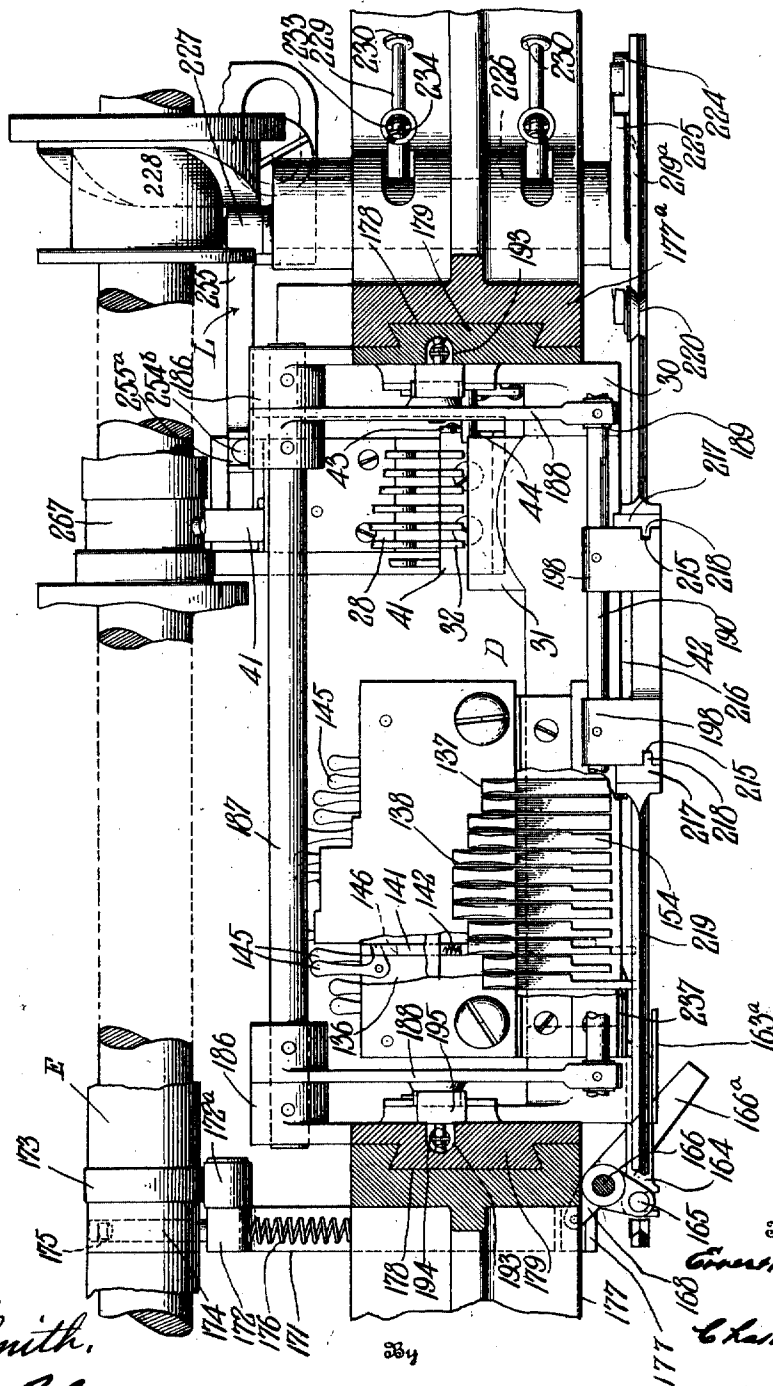
Attorney

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1,002,212.

Patented Sept. 5, 1911.
47 SHEETS—SHEET 15.

Fig. 24.



Witnesses
G. E. Smith.
H. C. Schmitt.

Inventor
E. B. Barber
C. H. H. H. H.
Attorney

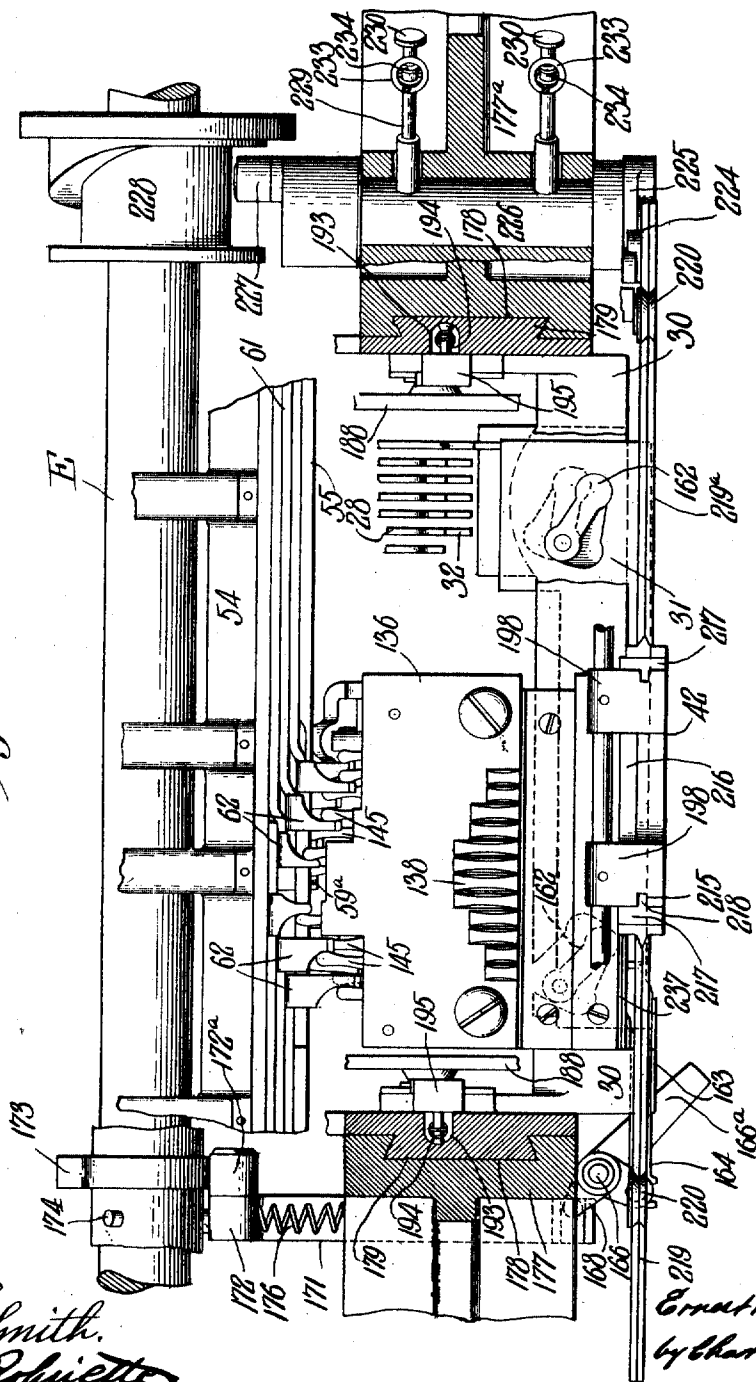
E. B. BARBER.
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1,002,212.

Patented Sept. 5, 1911.

47 SHEETS-SHEET 16.

Fig. 25.



Inventor

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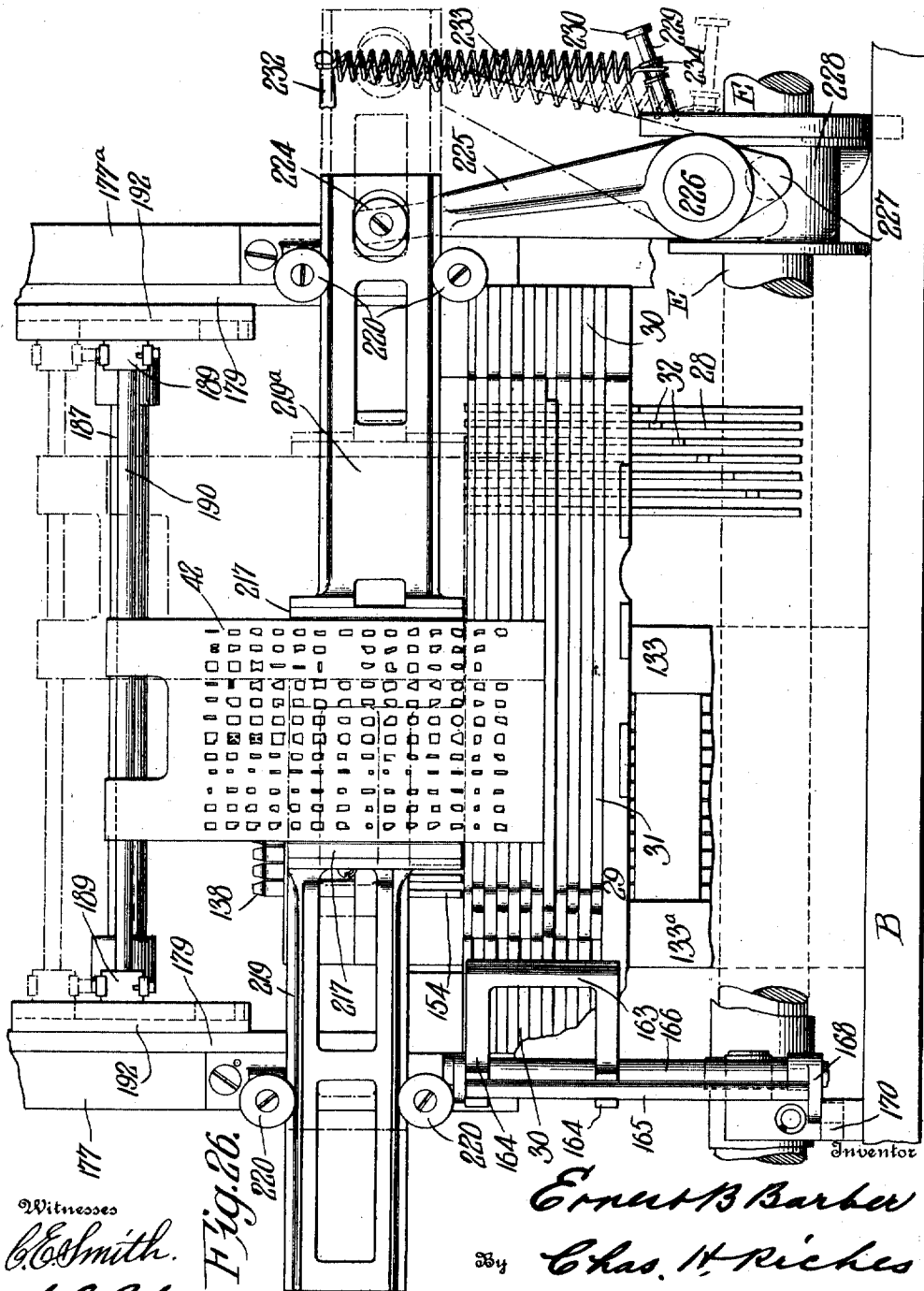
Witnesses

C. E. Smith.
H. R. Robinson

E. B. BARBER.
MACHINE FOR CASTING AND COMPOSING TYPE BODIES.
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Patented Sept. 5, 1911.
47 SHEETS-SHEET 17.



Witnesses
C. E. Smith.
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47 SHEETS—SHEET 18.

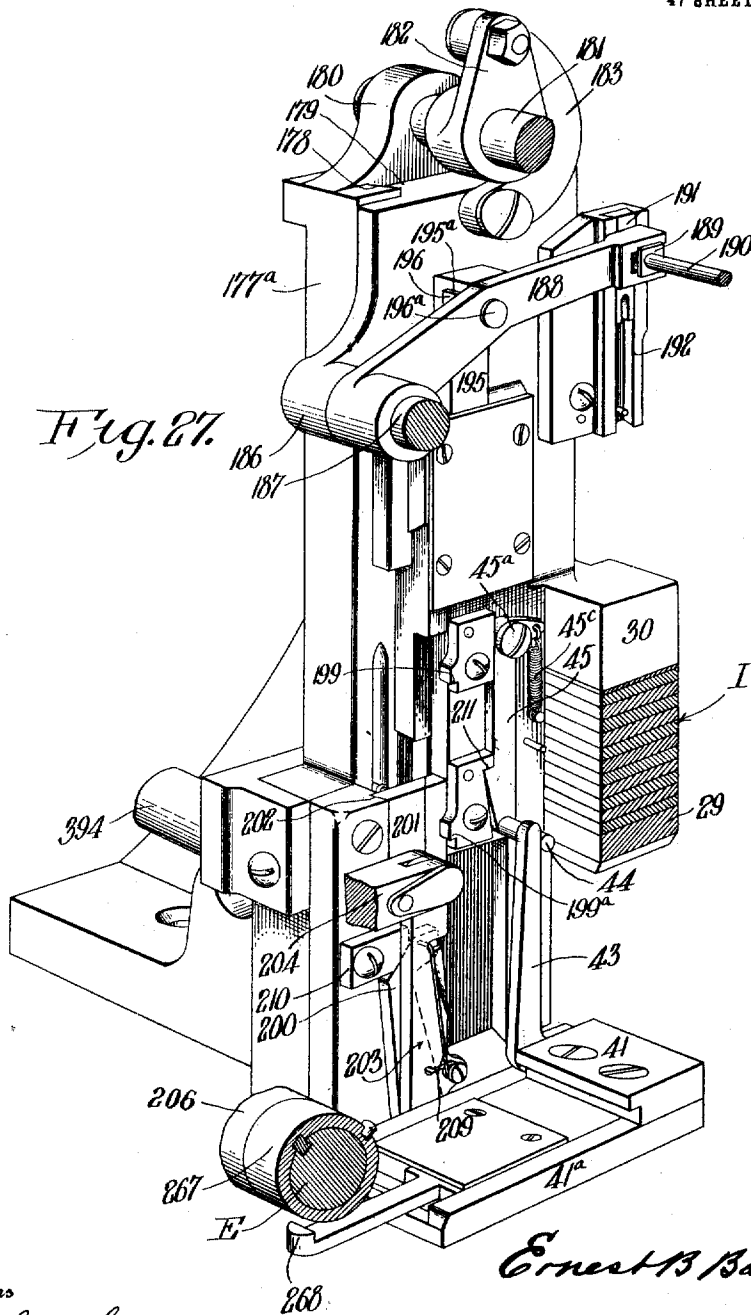


Fig. 27.

Witnesses
C. C. Smith.
H. R. Bennett.

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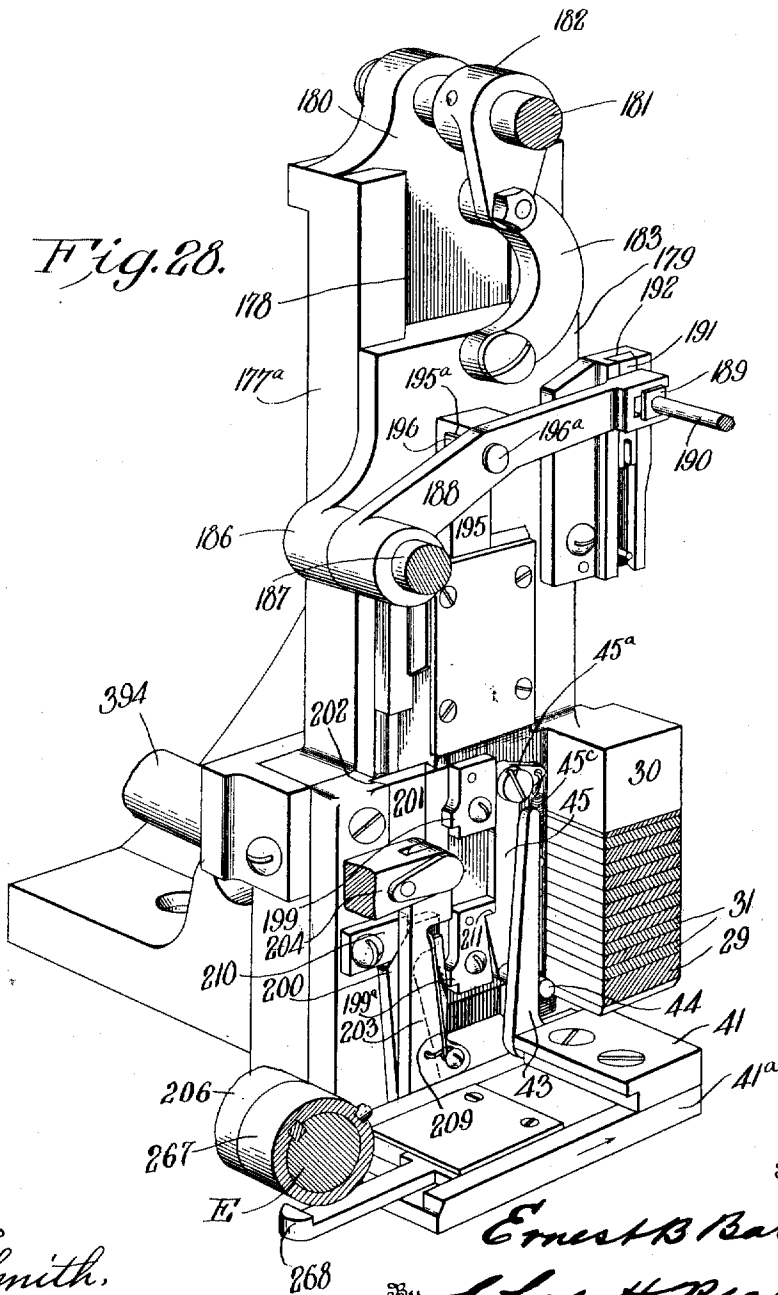
Attorney

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47 SHEETS—SHEET 19.



Inventor

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Witnesses

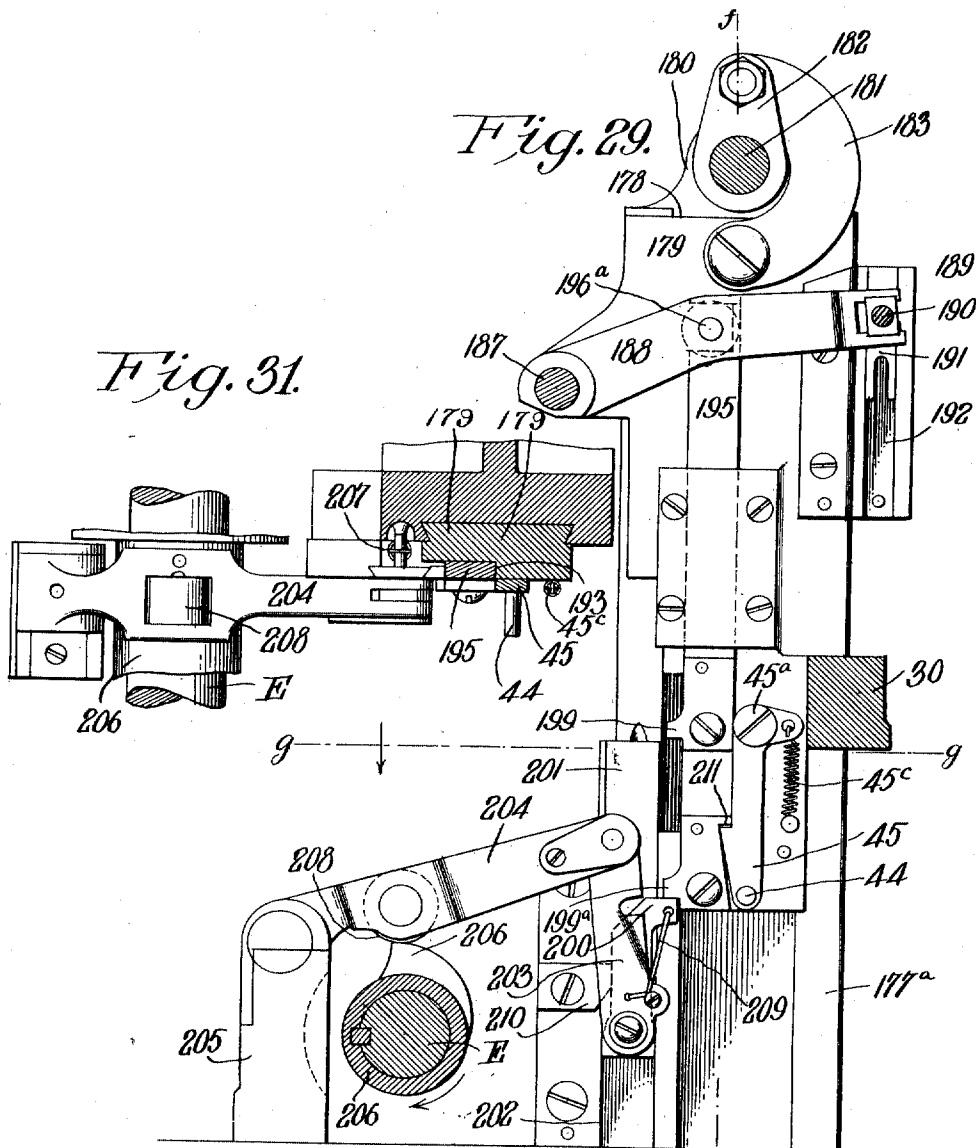
C. E. Smith,

H. L. Robmette

1,002,212.

Patented Sept. 5, 1911.

47 SHEETS-SHEET 20.



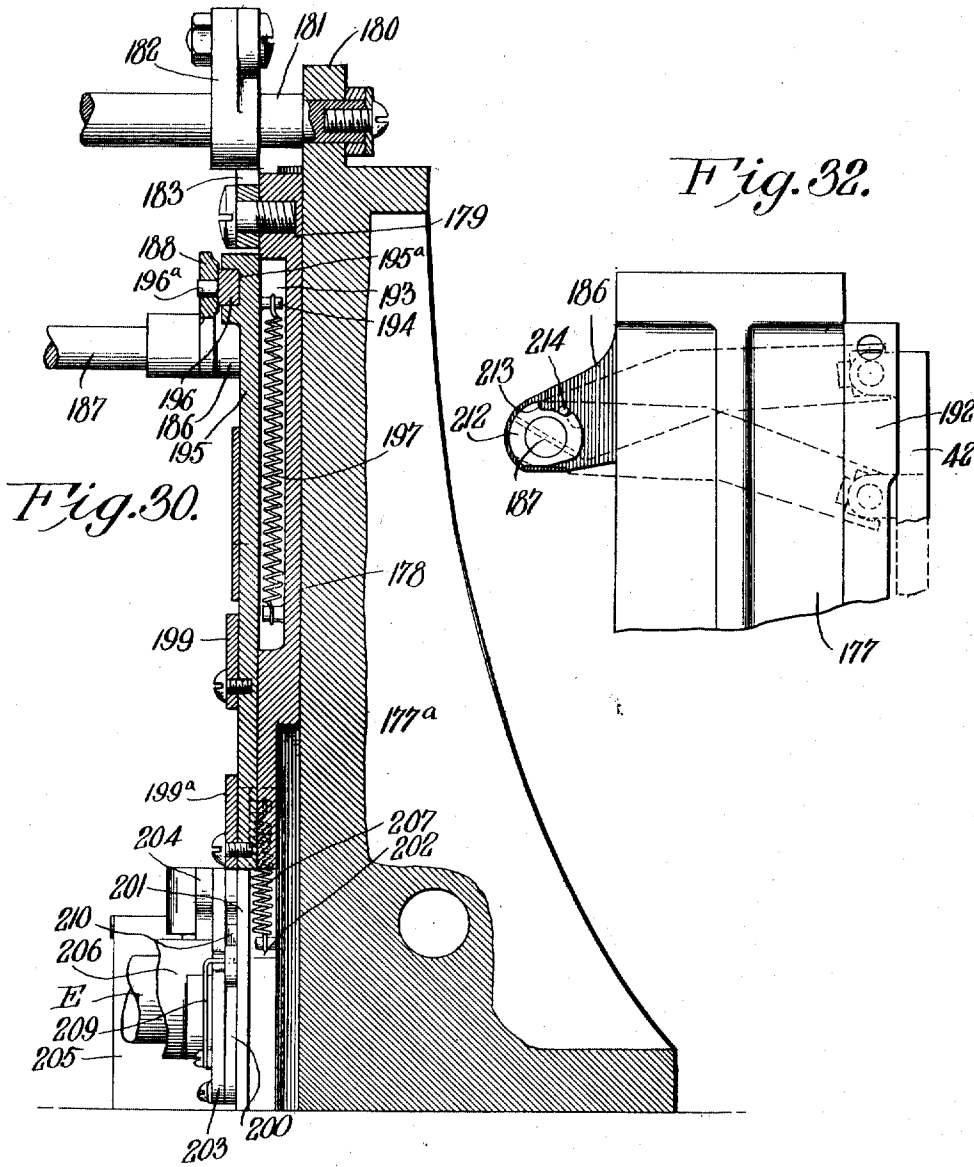
Witnesses
C. E. Smith
H. A. Roberts

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Ernest B. Barber
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MACHINE FOR CASTING AND COMPOSING TYPE BODIES.
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Patented Sept. 5, 1911.
47 SHEETS—SHEET 21.



Witnesses
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H. G. Rickett

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47 SHEETS—SHEET 22.

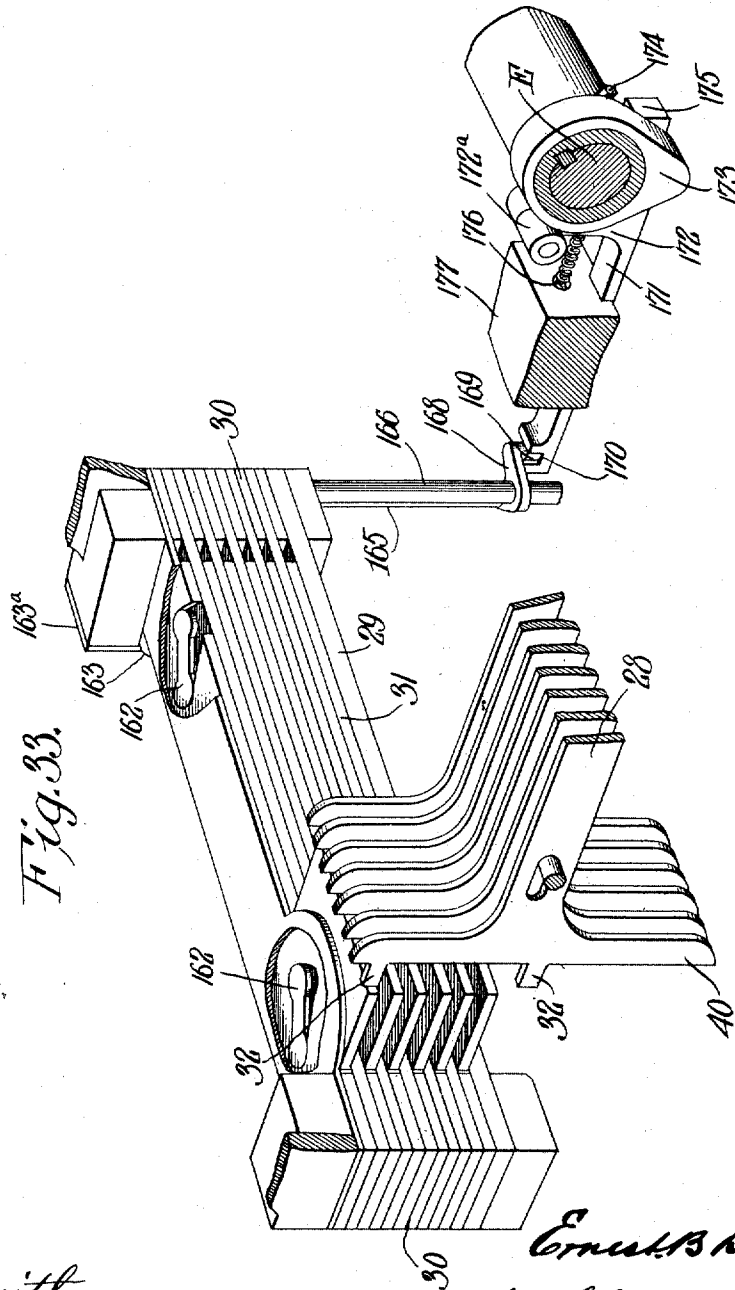


Fig. 33.

Witnesses
C. E. Smith.
H. A. Schmitt.

Inventor
Ernest B. Barber
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Attorney

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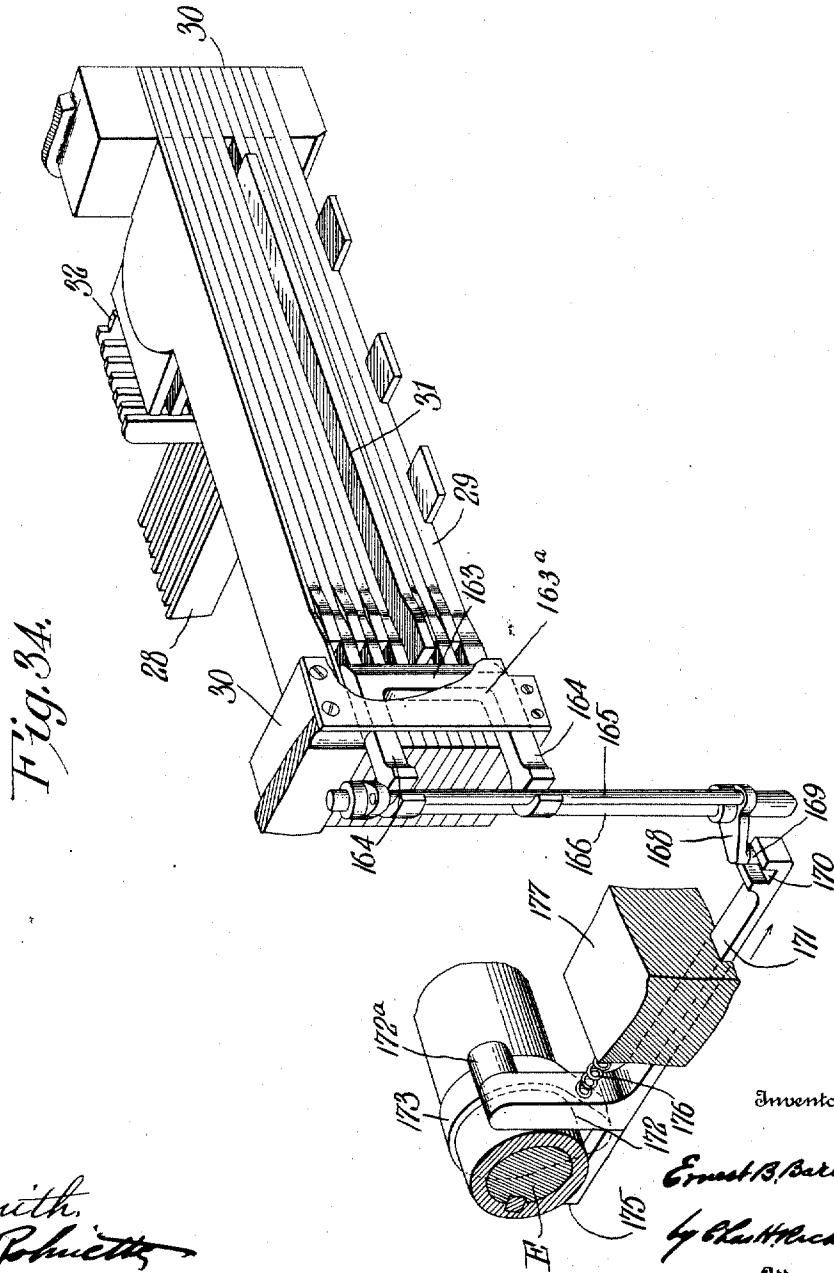
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47 SHEETS—SHEET 23.



E. B. BARBER.

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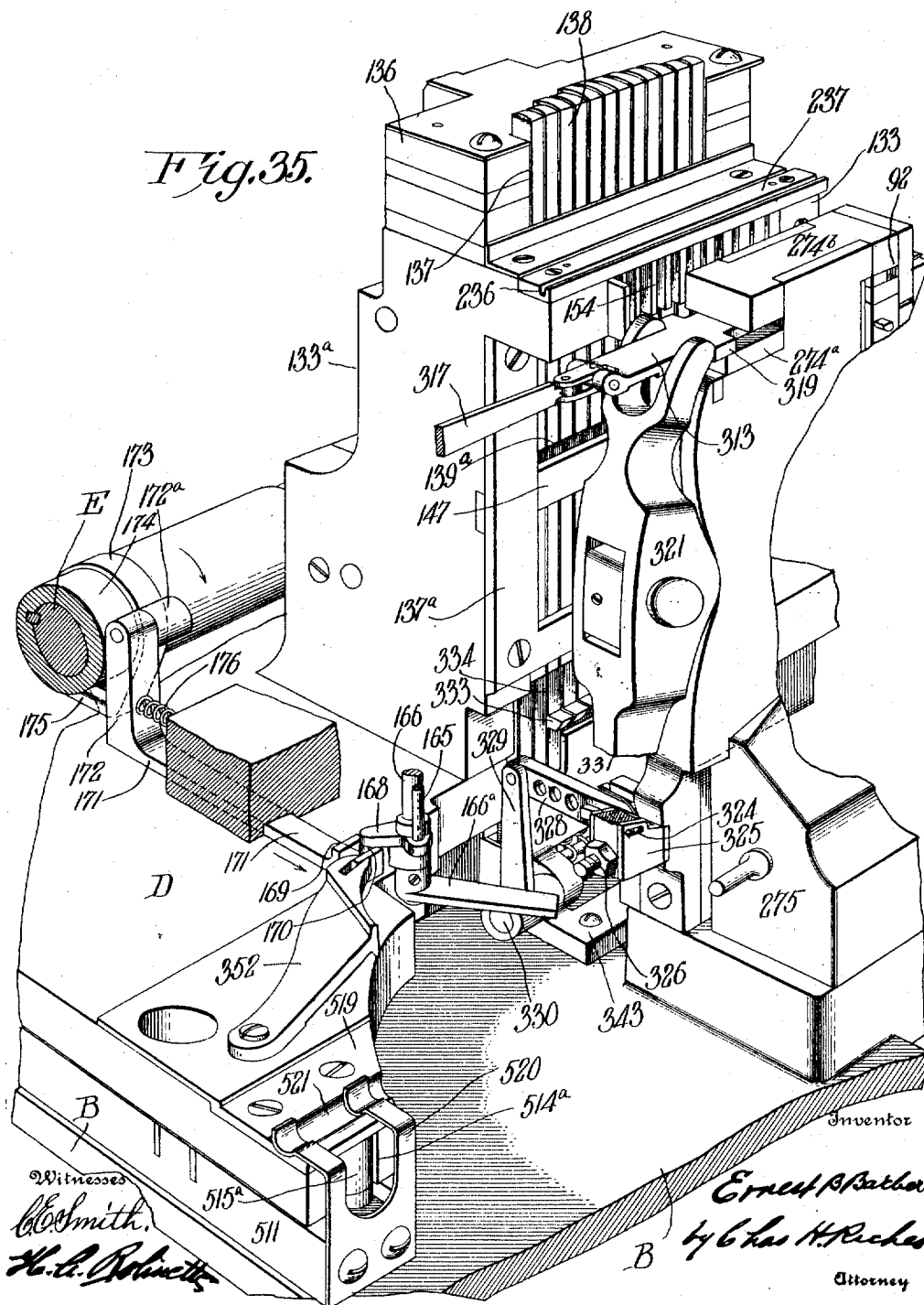
APPLICATION FILED MAR. 2, 1909. RENEWED SEPT. 16, 1910.

1,002,212.

Patented Sept. 5, 1911.

47 SHEETS—SHEET 24.

Fig. 35.



Inventor

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MACHINE FOR CASTING AND COMPOSING TYPE BODIES.

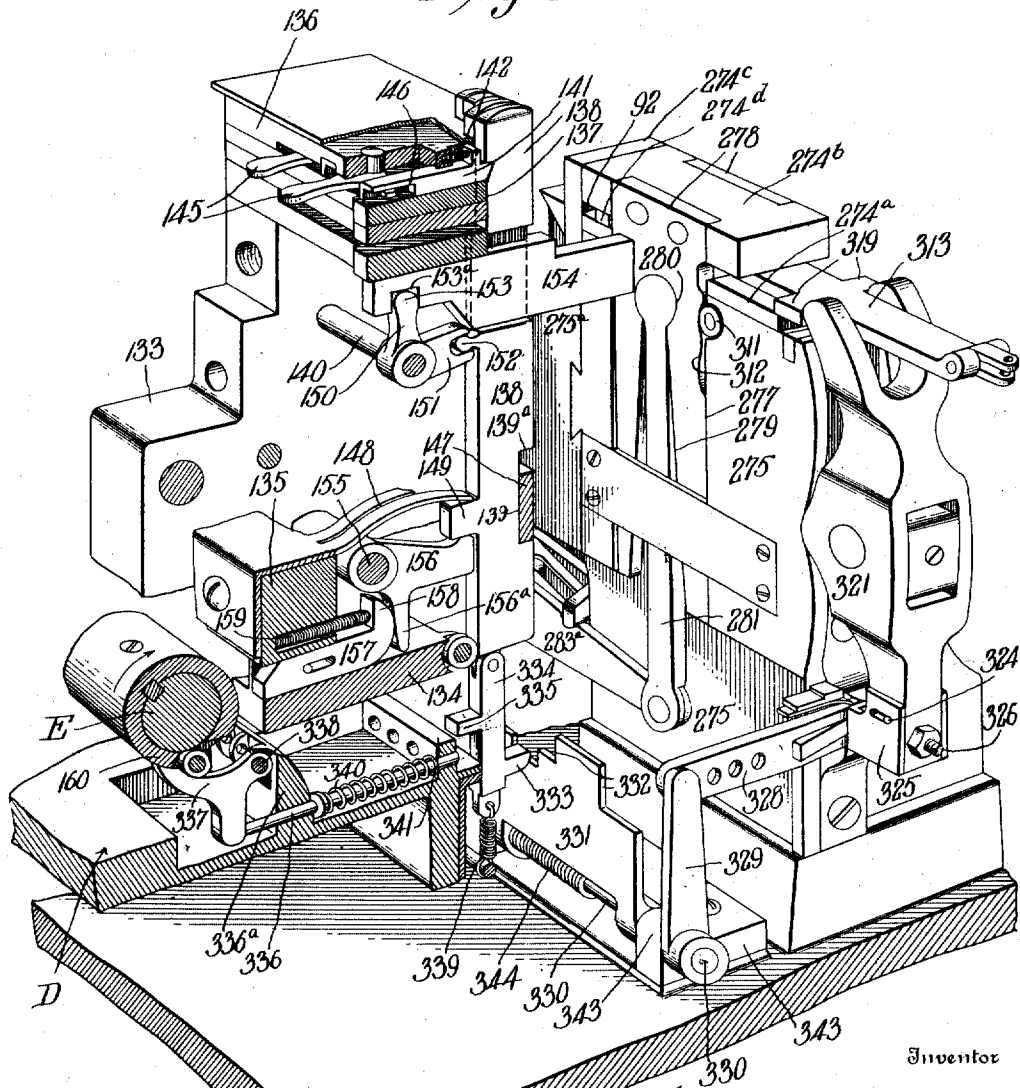
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47 SHEETS—SHEET 25.

Fig. 36.



Inventor

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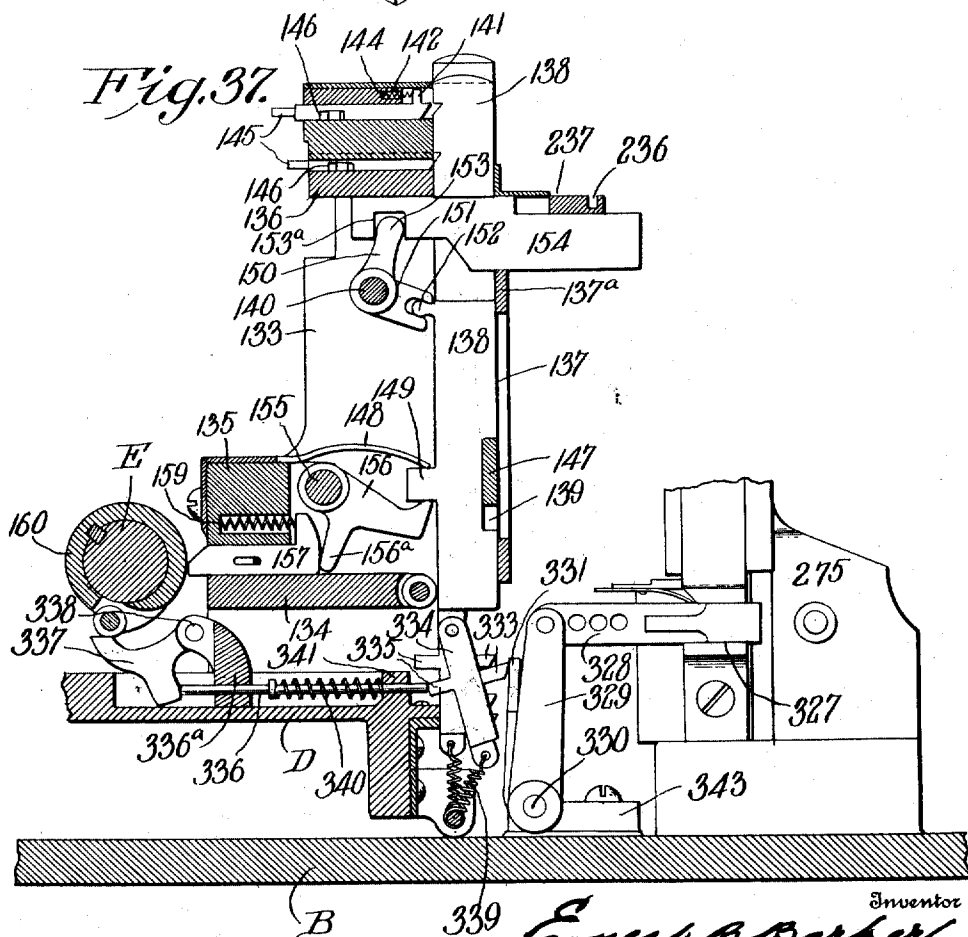
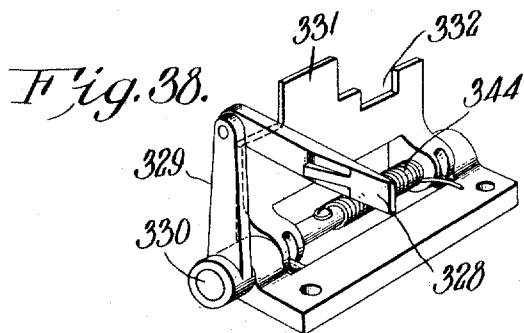
Witnesses
C. C. Smith, B.
H. C. Roberts

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MACHINE FOR CASTING AND COMPOSING TYPE BODIES.
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47 SHEETS—SHEET 26.

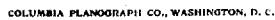


Witnesses
C. E. Smith.
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334, Chas. H. Riles
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APPLICATION FILED MAR. 2, 1909. RENEWED SEPT. 16, 1910.

47 SHEETS--SHEET 27.



E. B. BARBER.
MACHINE FOR CASTING AND COMPOSING TYPE BODIES.
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47 SHEETS—SHEET 28.

Fig. 43.

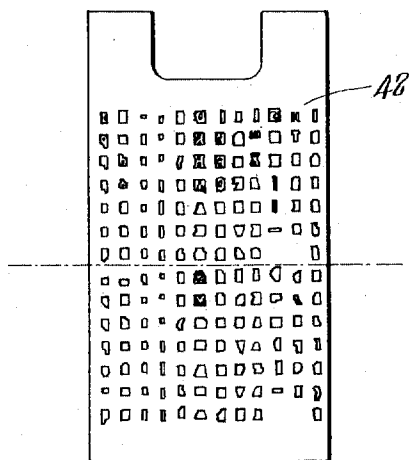


Fig. 42.

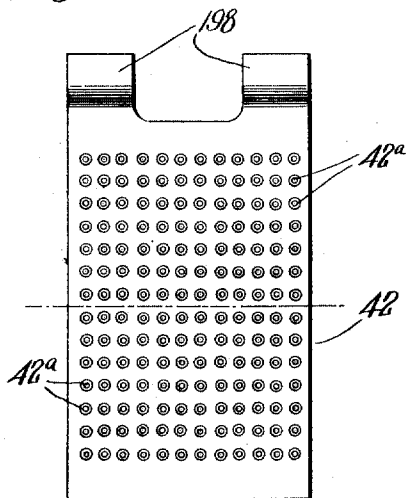
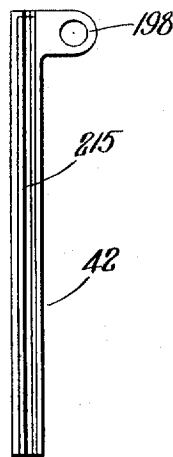


Fig. 44.



Inventor

Ernest B Barber

By

Chas. H. Riches

Attorney

Witnesses

C. C. Smith.

H. C. Pollock.

E. B. BARBER.

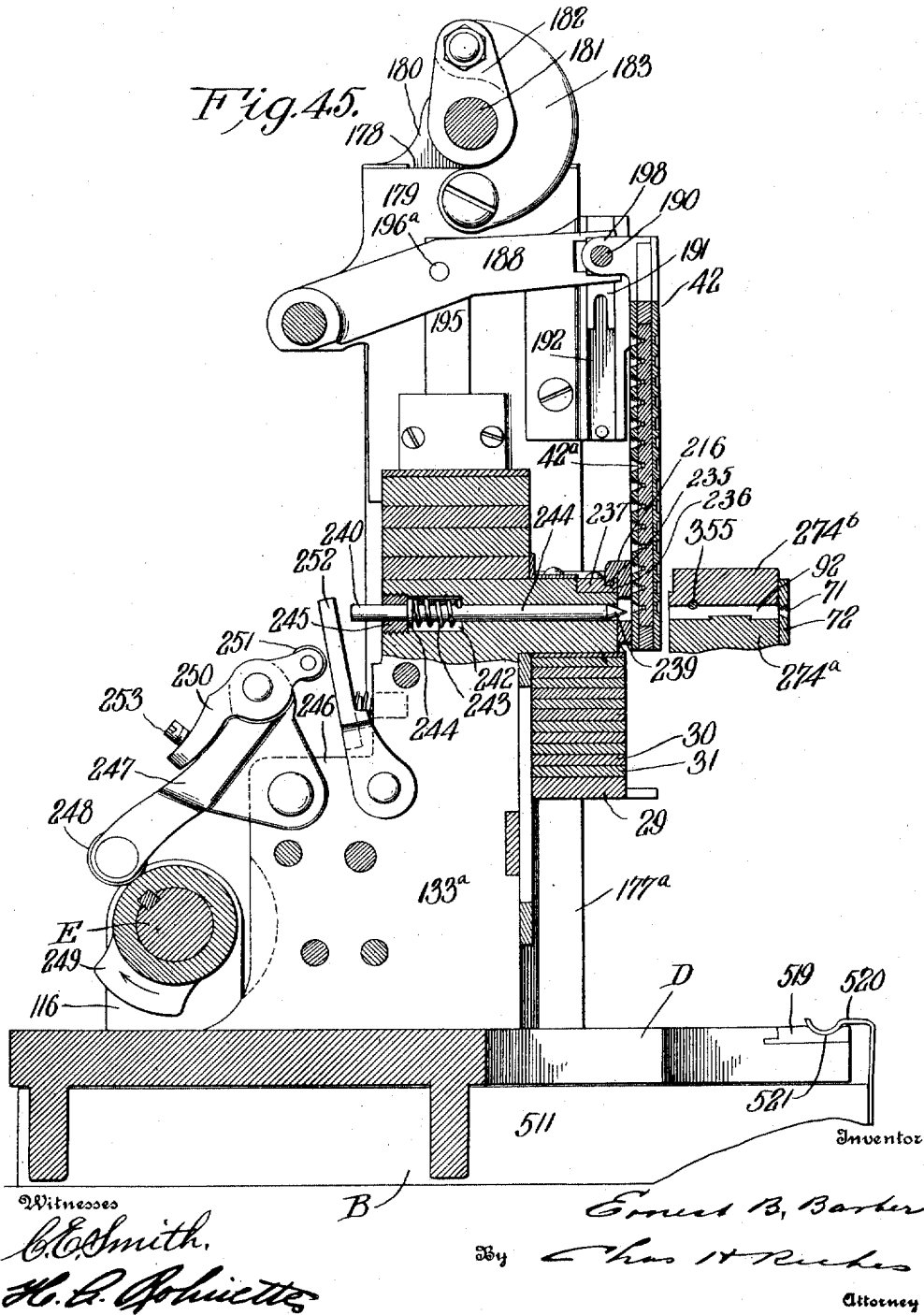
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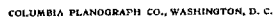
Patented Sept. 5, 1911.

47 SHEETS—SHEET 29.



APPLICATION FILED MAR. 2, 1909. RENEWED SEPT. 16, 1910.

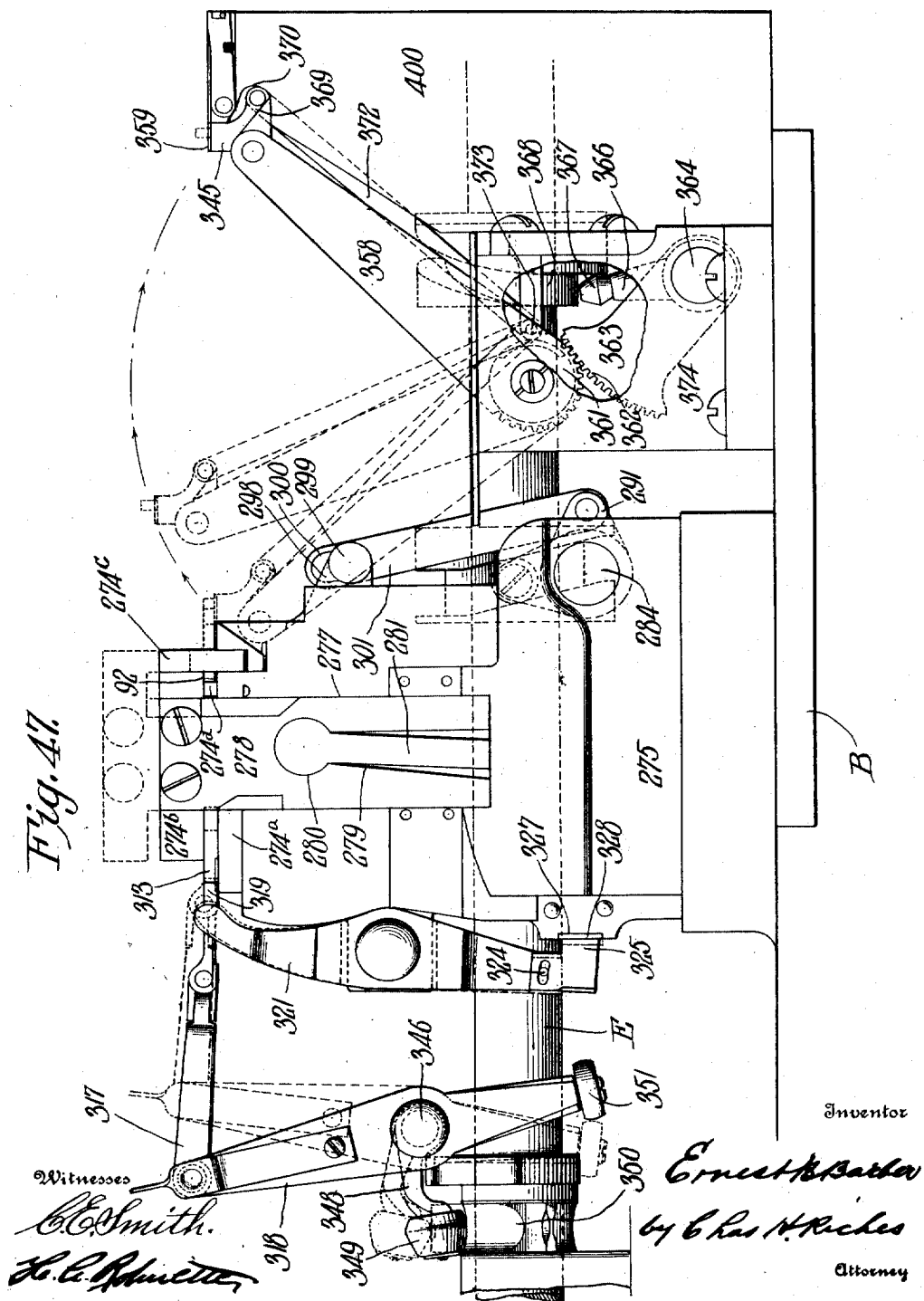
47 SHEETS—SHEET 30.



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47 SHEETS—SHEET 31.



COLUMBIA PLANOGRAPH CO., WASHINGTON, D. C.

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MACHINE FOR CASTING AND COMPOSING TYPE BODIES.

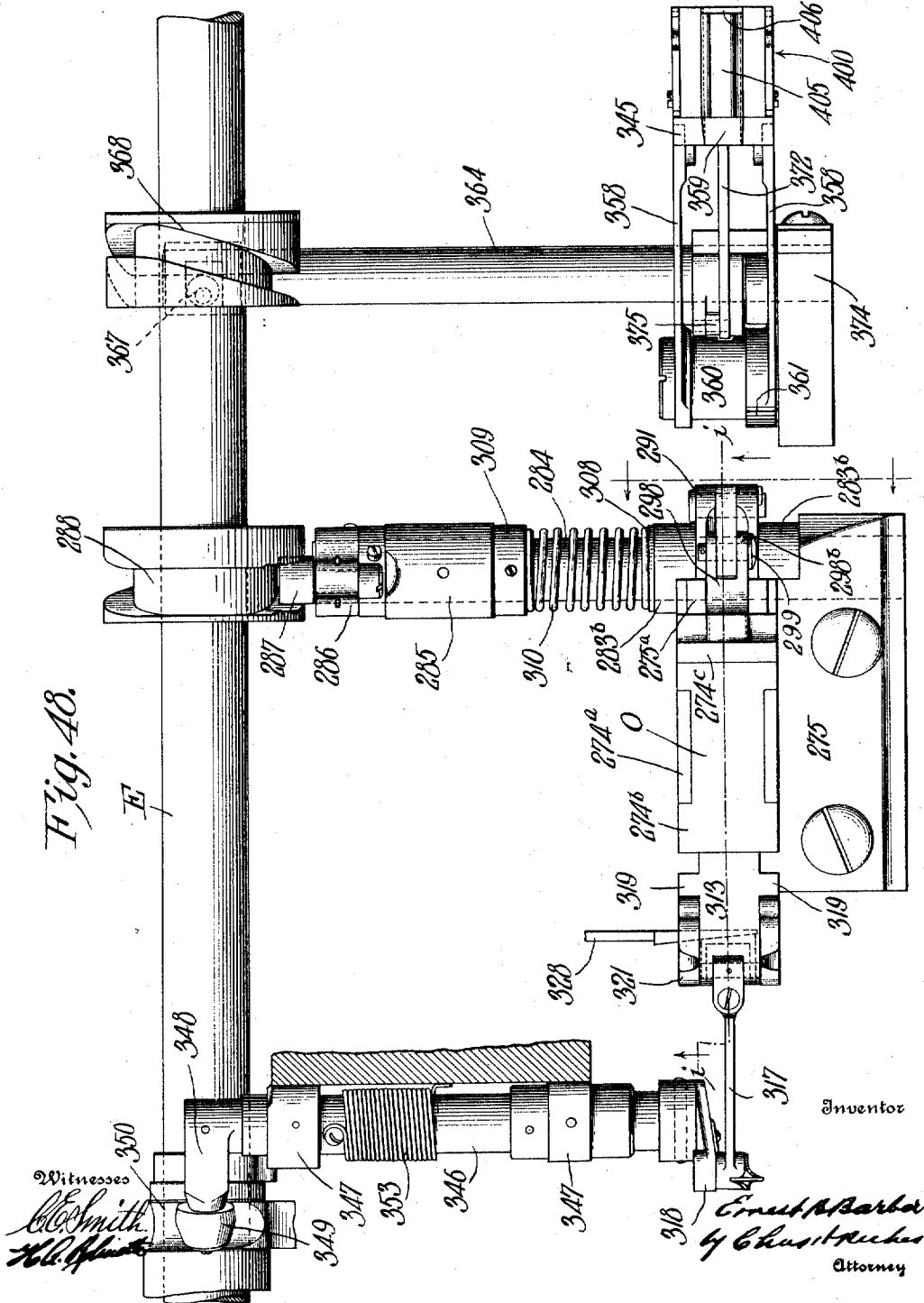
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47 SHEETS-SHEET 32.

Fig. 48.



1,002,212.

47 SHEETS--SHEET 33.



Witnesses

C. E. Smith.
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Inventor

Ernest B. Barber

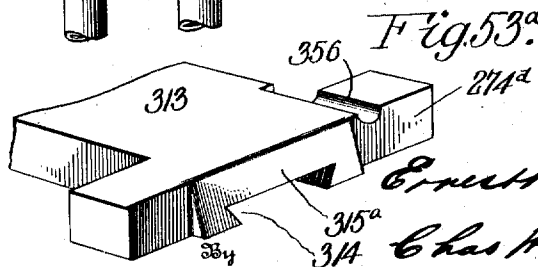
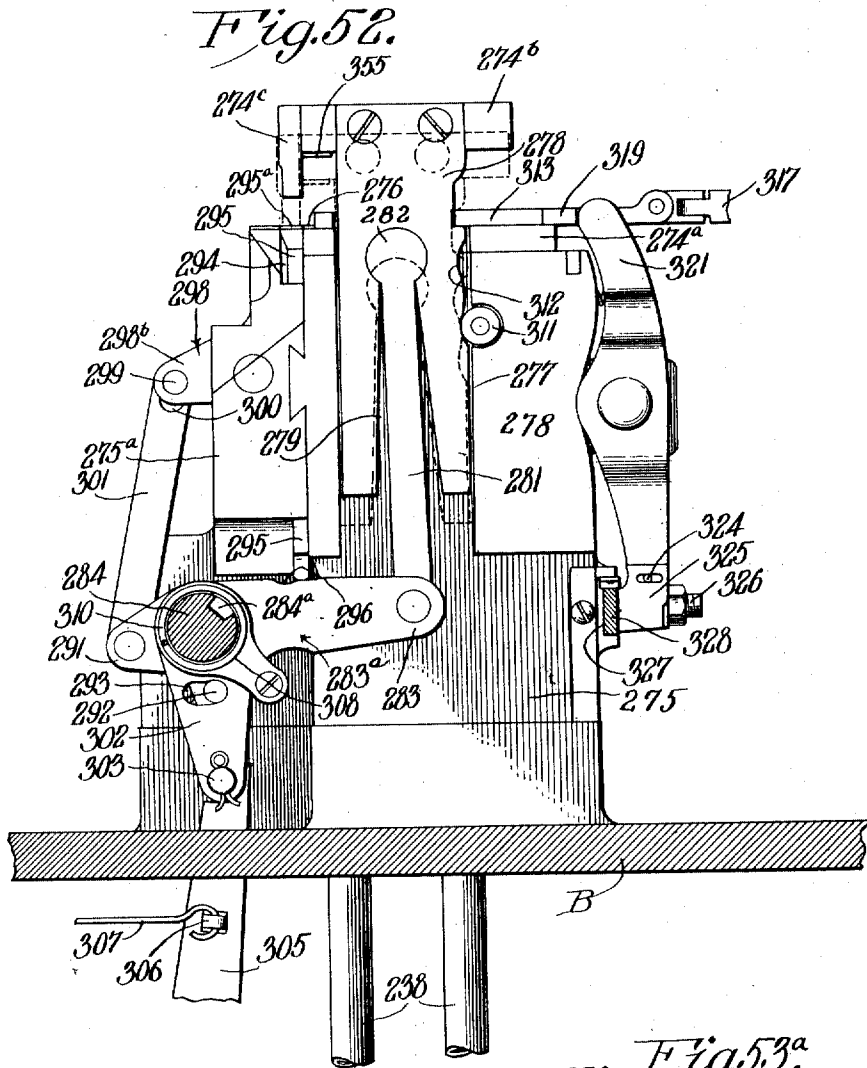
by Chas. H. Riches

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47 SHEETS—SHEET 34.



Witnesses
C. E. Smith.
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Inventor

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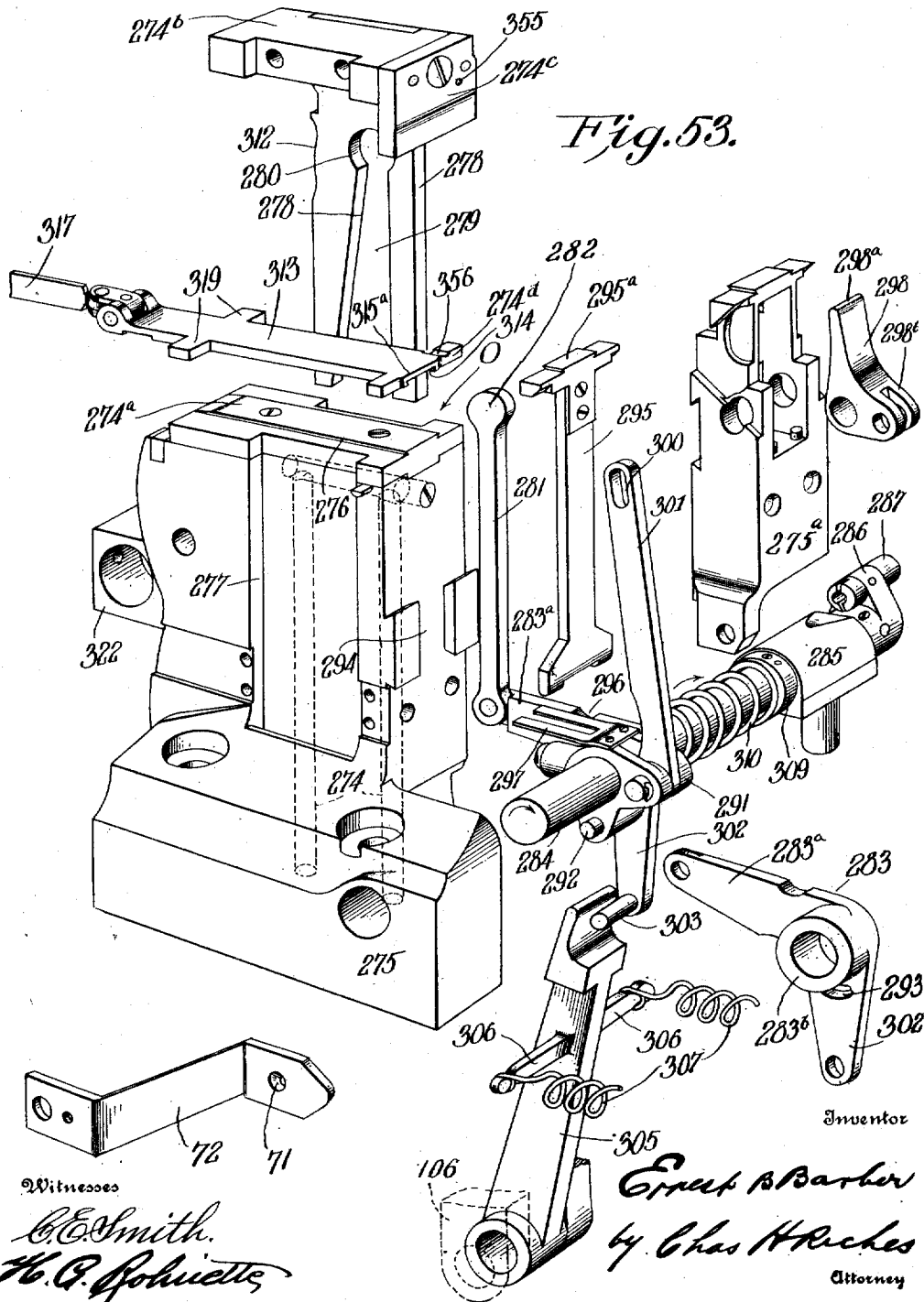
Chas H. Riches

Attorney

E. B. BARBER.
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47 SHEETS—SHEET 35.



E. B. BARBER.
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47 SHEETS—SHEET 36.

Fig. 54.

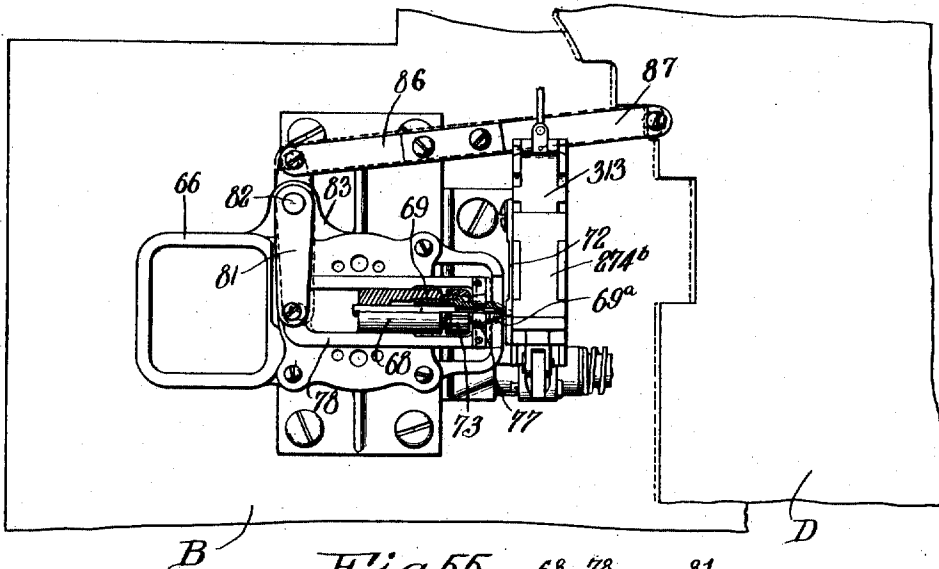


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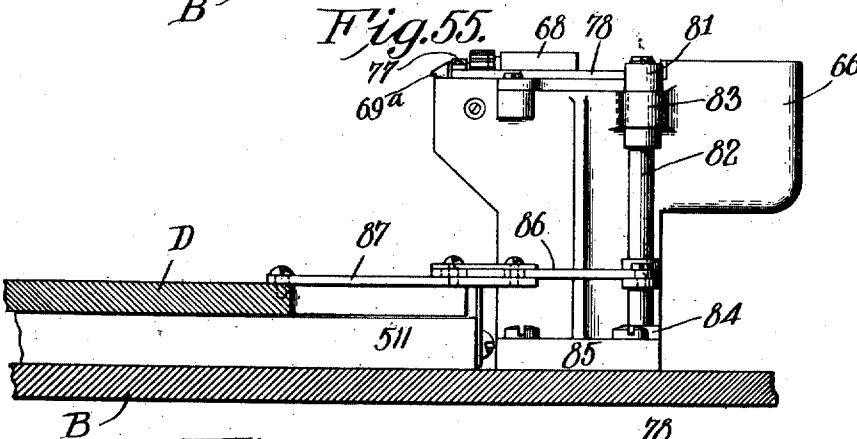
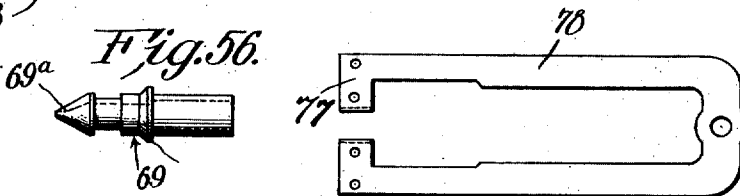


Fig. 56.



Inventor

Fig. 57. E. B. Barber

36,4 *Chas. H. Riches*

Attorney

Witnesses

C. C. Smith.
H. C. Roberts

1,002,212.

Patented Sept. 5, 1911.

47 SHEETS—SHEET 37.

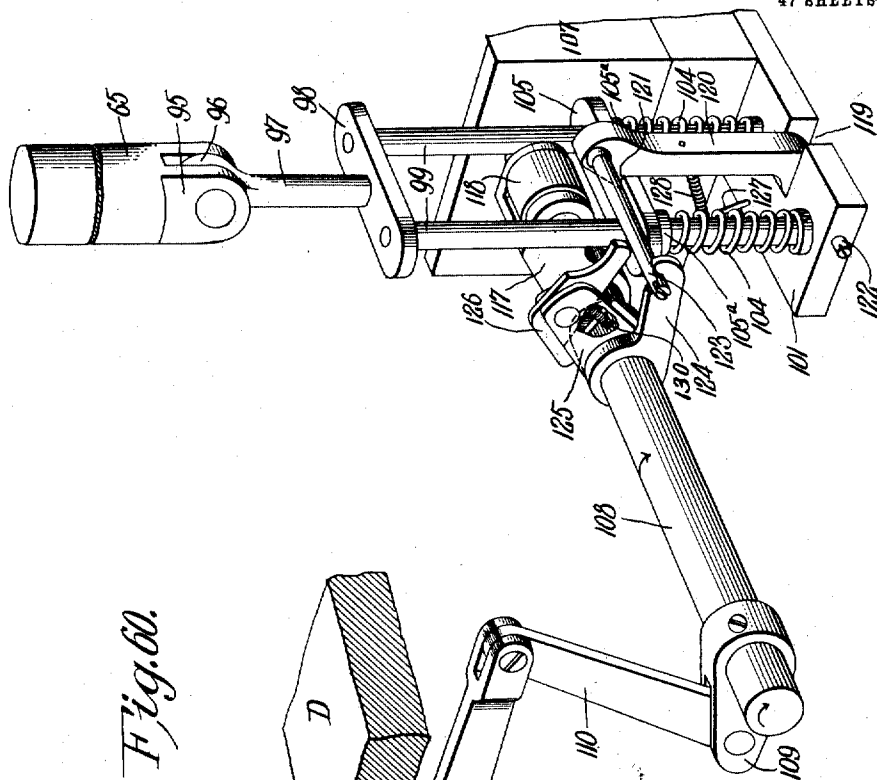


Fig. 60.

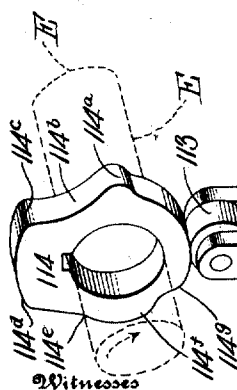
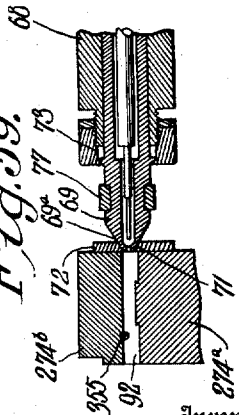


Fig. 58.

Fig. 59.



E. B. BARBER.

MACHINE FOR CASTING AND COMPOSING TYPE BODIES.

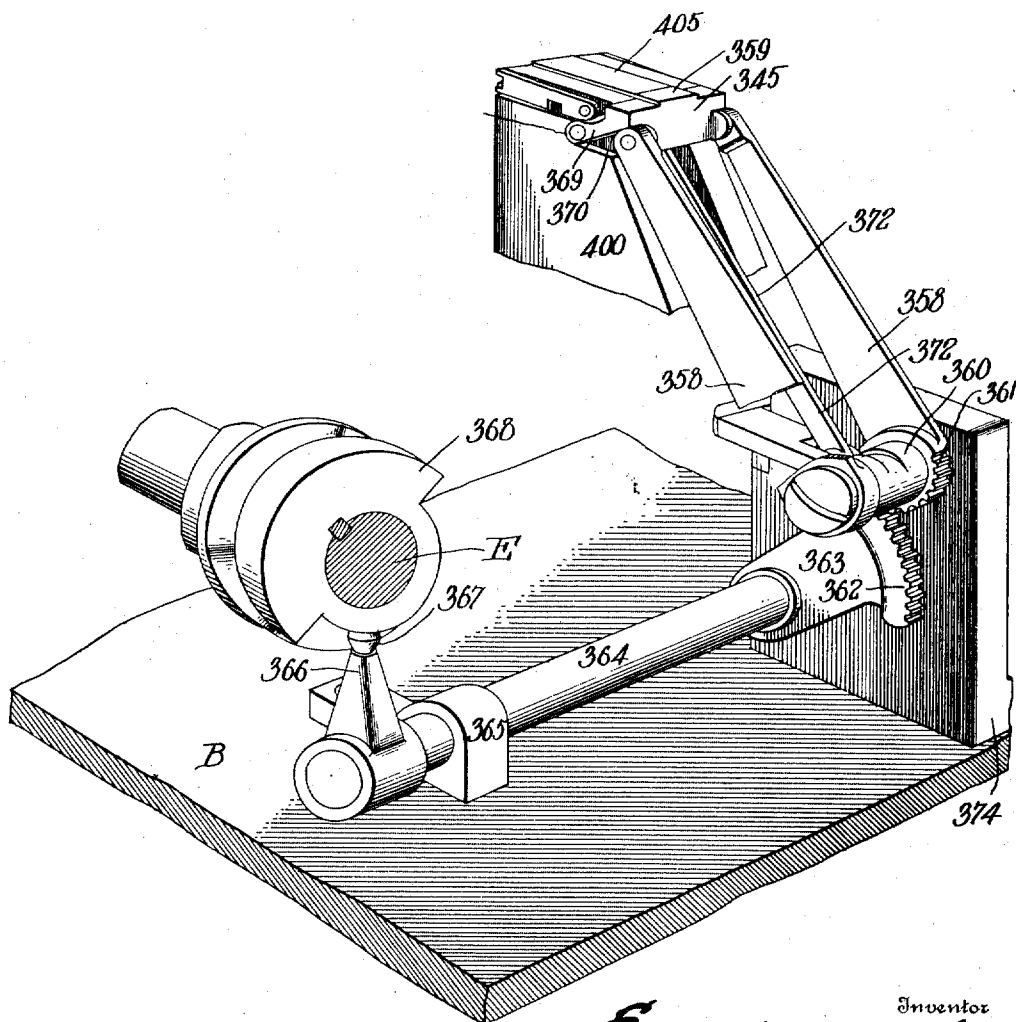
APPLICATION FILED MAR. 2, 1909. RENEWED SEPT. 16, 1910.

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Patented Sept. 5, 1911.

47 SHEETS-SHEET 38.

Fig. 61.



Witnesses

C. E. Smith.
H. C. Schuchter.

Inventor
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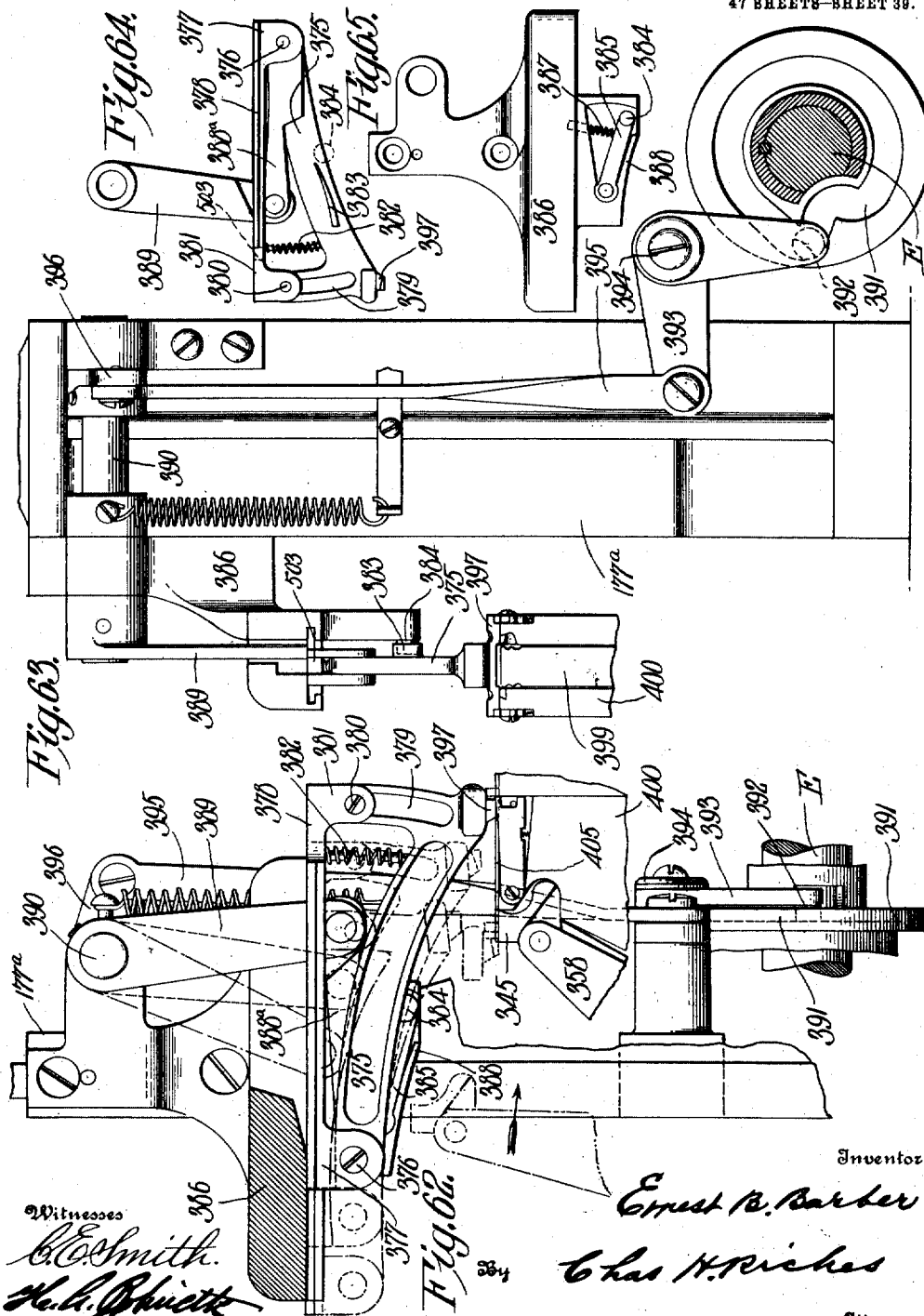
Attorney

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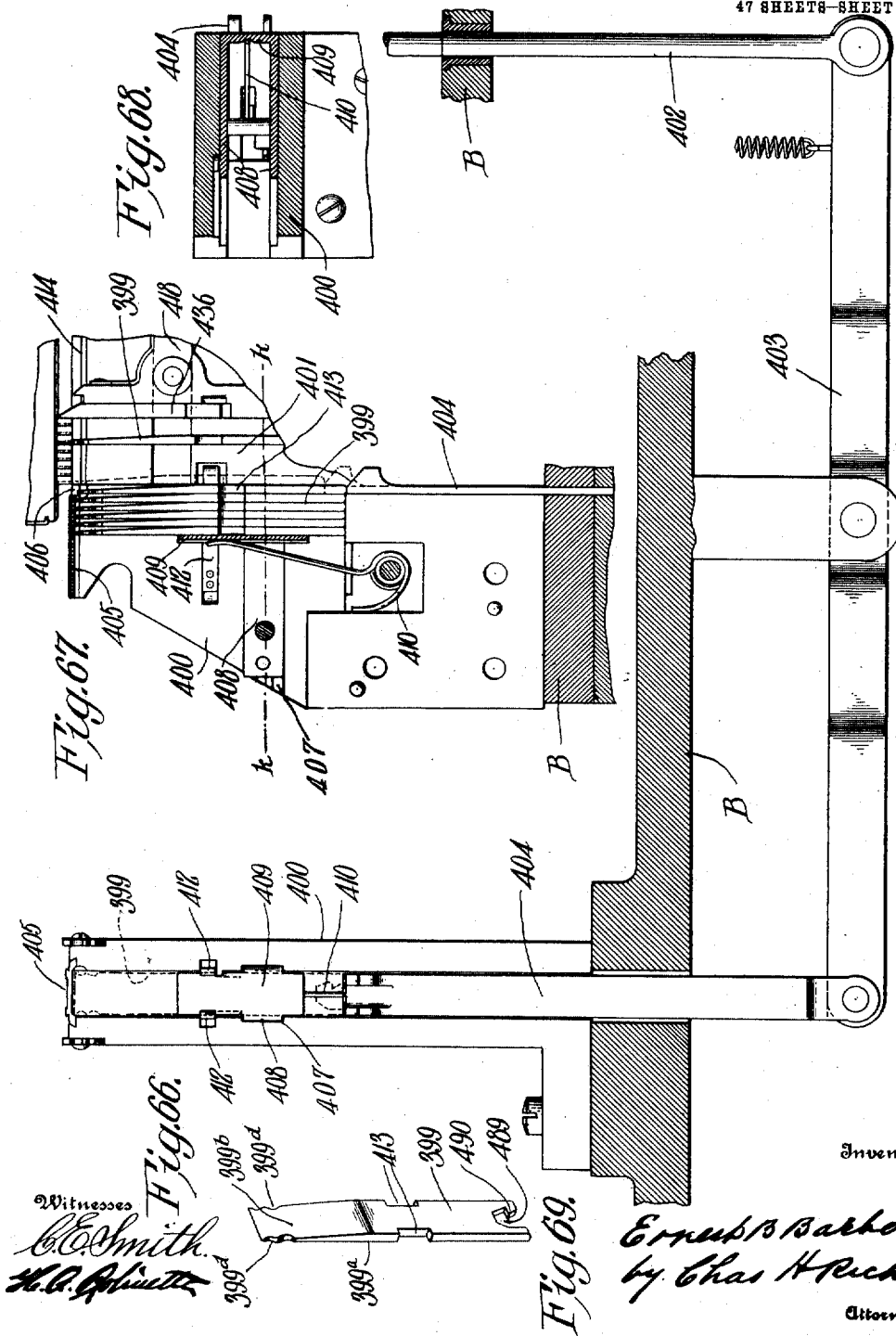
47 SHEETS—SHEET 39.



1,002,212.

Patented Sept. 5, 1911.

47 SHEETS—SHEET 40.



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1,002,212.

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47 SHEETS—SHEET 41.

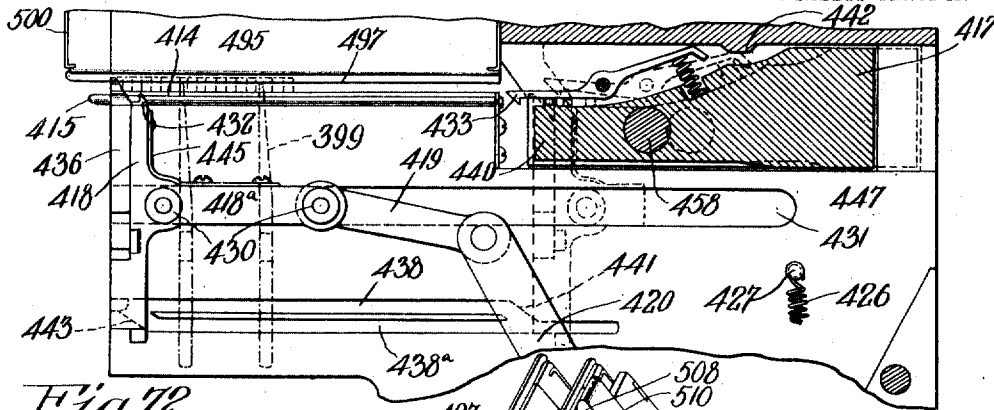


Fig. 72.

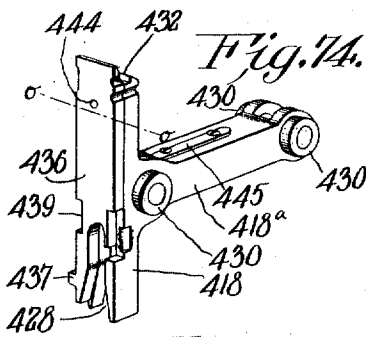


Fig. 74.

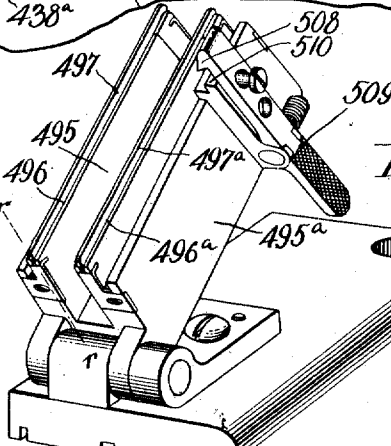


Fig. 70.

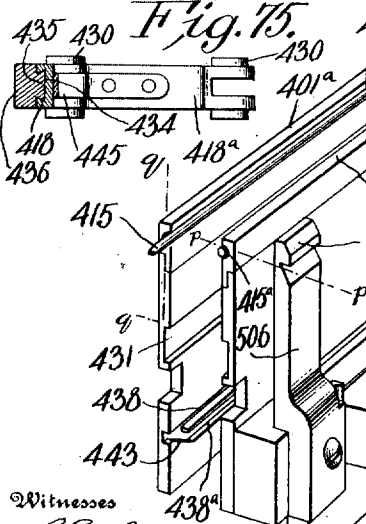
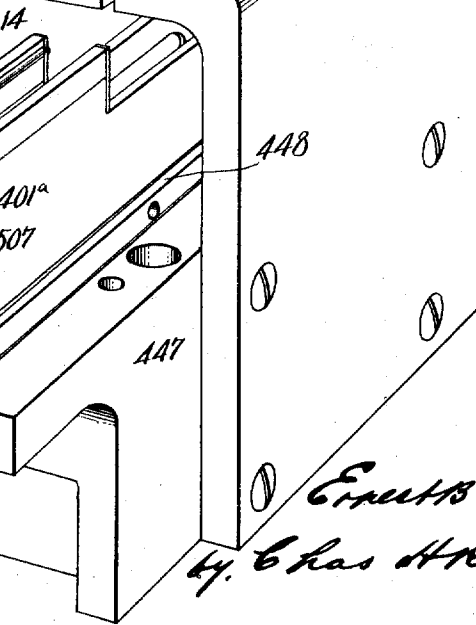


Fig. 75.

Witnesses
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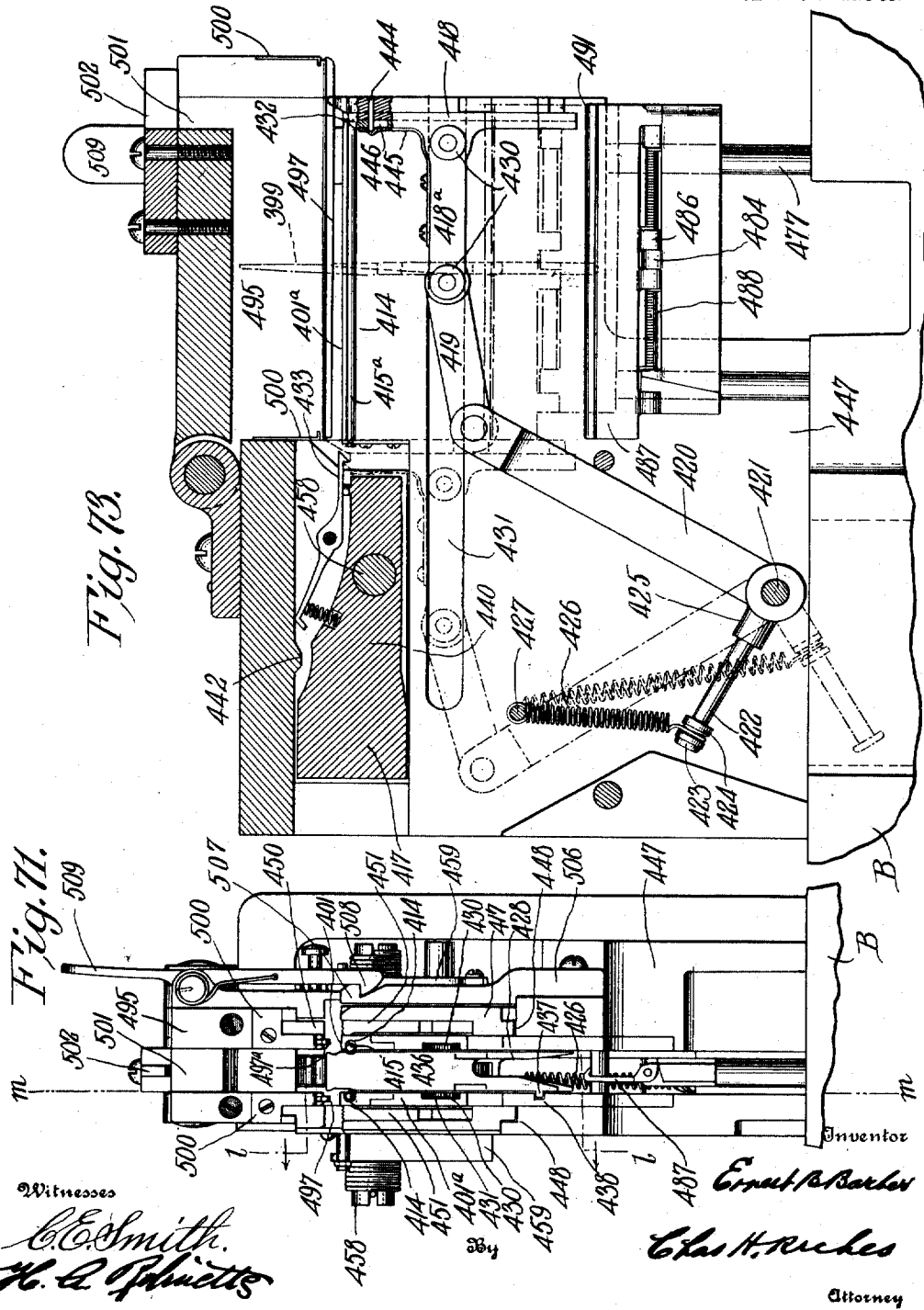
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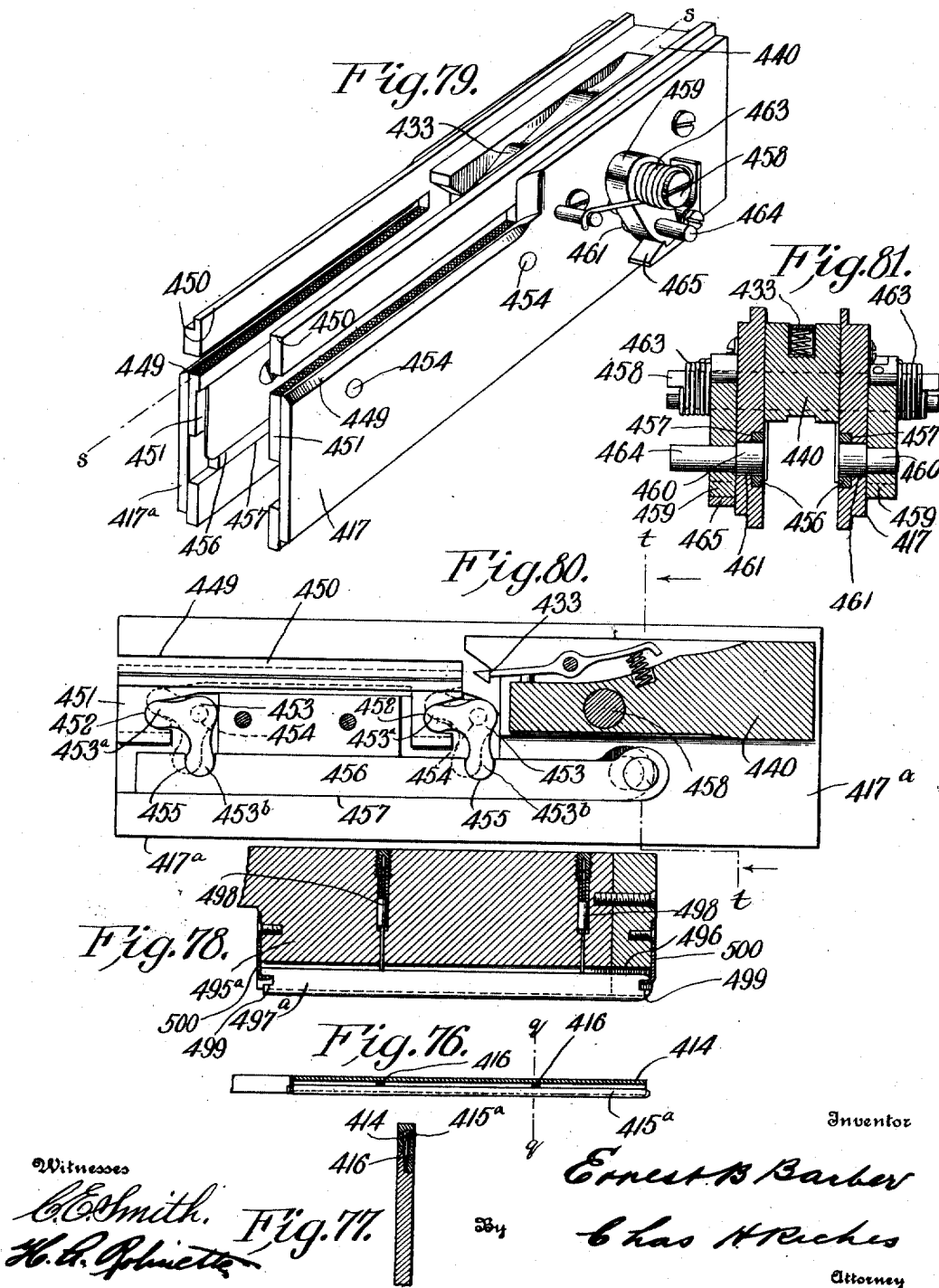
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47 SHEETS-SHEET 43.



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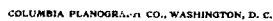
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MACHINE FOR CASTING AND COMPOSING TYPE BODIES.

1,002,212.

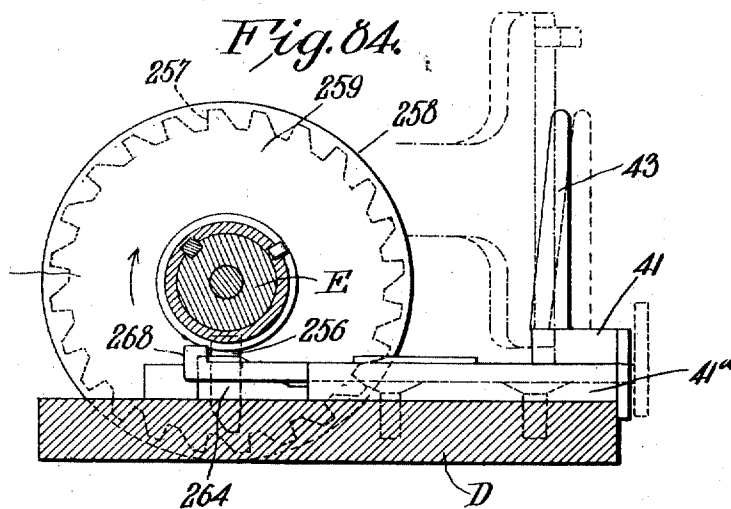
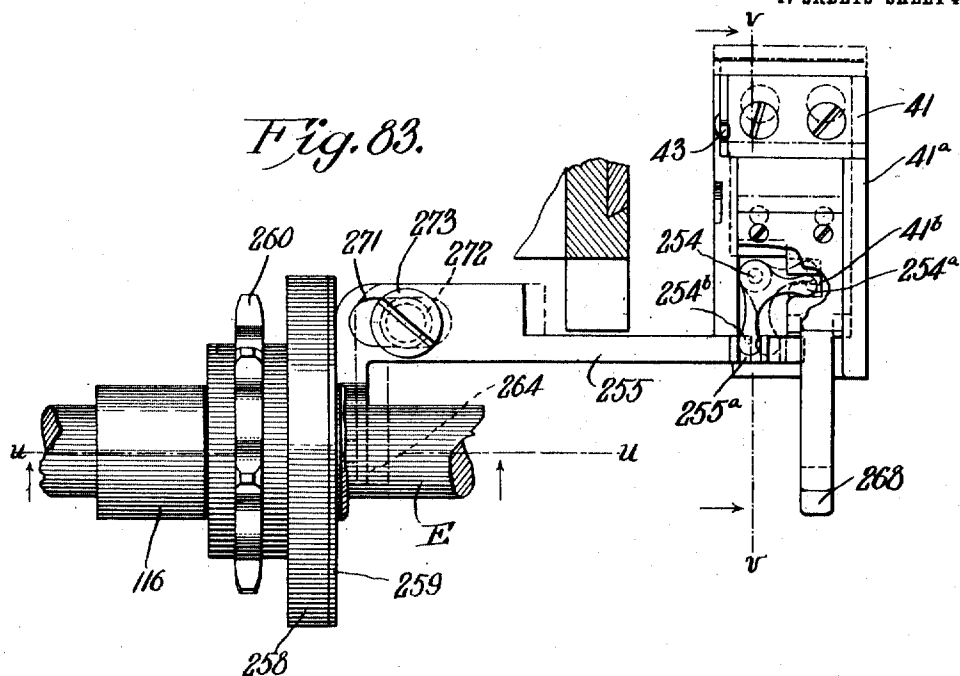
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MACHINE FOR CASTING AND COMPOSING TYPE BODIES.
APPLICATION FILED MAR. 2, 1909. RENEWED SEPT. 16, 1910.

Patented Sept. 5, 1911.

47 SHEETS—SHEET 46.



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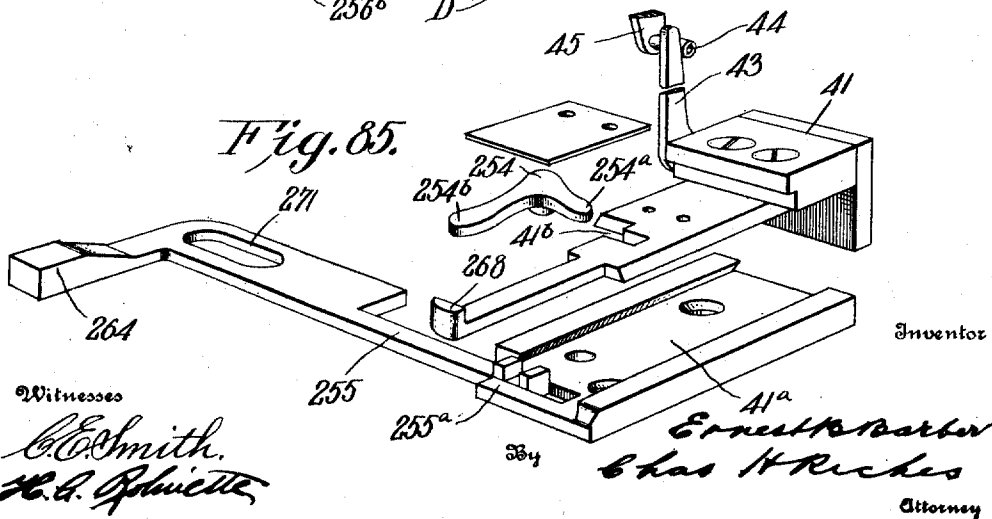
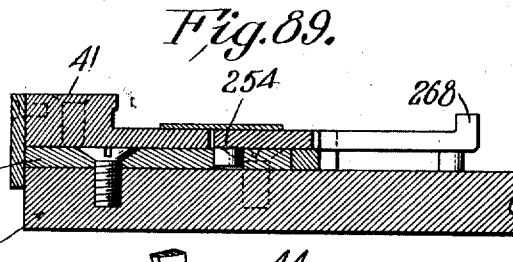
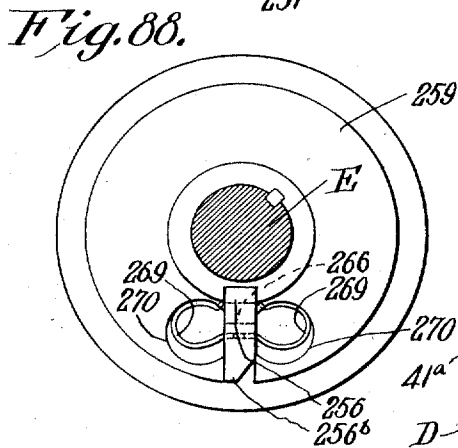
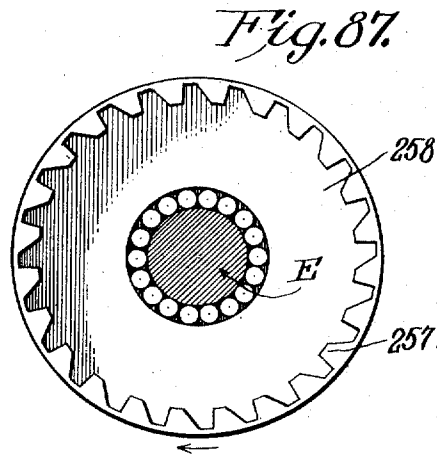
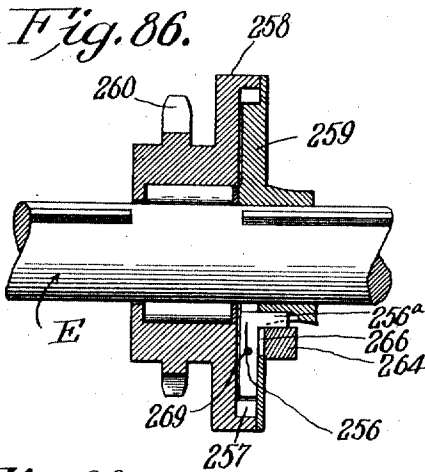
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MACHINE FOR CASTING AND COMPOSING TYPE BODIES.
APPLICATION FILED MAR. 2, 1909. RENEWED SEPT. 16, 1910.

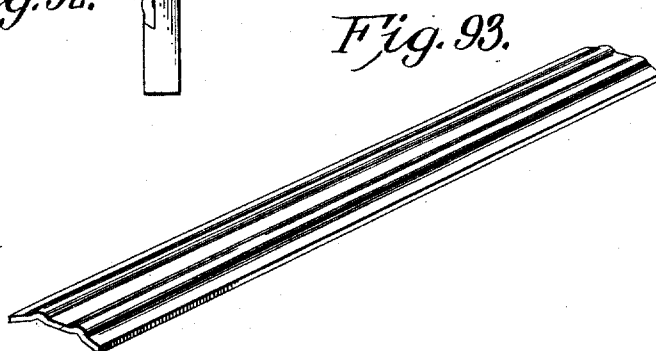
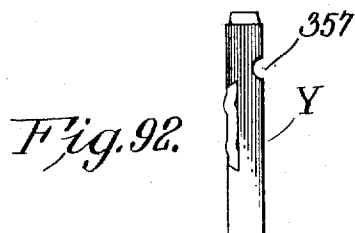
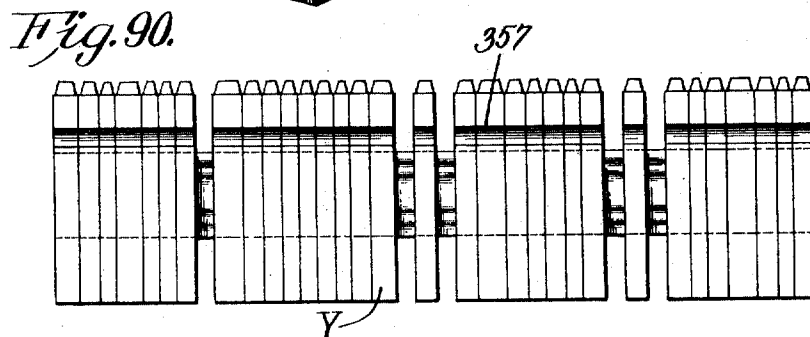
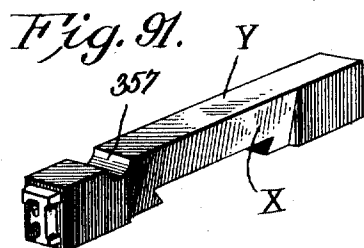
1,002,212.

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47 SHEETS—SHEET 46.



1,002,212.

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47 SHEETS—SHEET 47.



Witnesses

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UNITED STATES PATENT OFFICE.

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MACHINE FOR CASTING AND COMPOSING TYPE-BODIES.

1,002,212.

Specification of Letters Patent.

Patented Sept. 5, 1911.

Application filed March 2, 1909, Serial No. 480,828. Renewed September 16, 1910. Serial No. 582,394.

To all whom it may concern:

Be it known that I, ERNEST BENJAMIN BARBER, of the city of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Machines for Casting and Composing Type-Bodies; and I hereby declare that the following is a full, clear, and exact description of the same.

My invention relates to that class of type casting and composing machines, disclosed in Letters Patent of the United States No. 896,908, issued to Adam Winfield Hanigan, on the 25th day of August, 1908, in which type bodies are cast in individual and sequential order.

The purpose of the Hanigan invention is to produce type bodies, with dove tail grooves intermediate their ends, and assemble them side by side in the order of their production into composed words, introducing between the type bodies at proper intervals "adjusting spacers" to complete the formation of a line. The line, of type bodies and spacers so assembled, is justified by advancing the spacers and spreading the assembled matter to the predetermined length of line, following which the type bodies are locked, in their justified condition, by appropriate means, the spacers being then withdrawn, and a locking strip placed in the dove tail grooves in the type bodies, each line then becoming substantially a solid justified line of type bodies to be delivered to a galley from which the lines may be taken and set up for use on a printing press.

The above mentioned patent describes the use of parallel matrix bars maintained in an upright tensioned position, each having on one edge matrix characters properly proportioned to the thickness of the matrix bar, a key-board, the manipulation of which through appropriate connections sets a stop at a proper level to receive a matrix bar, released simultaneously with the setting of the stop, and sets in motion the mechanism which automatically effects the succeeding operations of producing a type body of proper size having in relief the character indicated on the key-board.

The novel features of Hanigan's invention seem primarily to be in the direct application of the key-board to produce a desired type body, and in the assembling,

justifying, and solidifying of the line. Prior to Hanigan's invention machines constructed to produce type bodies in desired order consisted of two machines, one of which is generally known as a key-board or indicating machine, and the other as a casting machine. The function of the key-board or indicating machine is to perforate a narrow paper ribbon, termed a record strip, with holes in combination as representative of a desired character. This record strip is then placed in the controller apparatus of the casting machine, the controller agent generally being compressed air or electro-magnets, and with its perforations, passing under the controller points or openings, actuates the character positioning and casting mechanisms to produce an indicated type body. Justification of the line is usually effected by the operator of the key-board machine indicating on the record strip the number of units necessary to complete the line, the casting machine, generally through a complicated mechanism, making provision to cast a space of greater or less quantity to effect the proper division of the line to a predetermined measure.

I have sought in the machine hereinafter described to perfect a mechanism in which, beyond the manual work required to operate a key-board, the machine shall automatically produce, in any order desired, individual type bodies which may be, and are, composed into a line side by side together with spacers selectively inserted between them, that the machine being set to produce lines of type bodies of a predetermined measure, the spacers are used to spread the type bodies apart. The type bodies are then locked and, upon the withdrawal of the spacers the type bodies so spaced to a predetermined measure, are amalgamated together so as to form a substantially solid line of type characters evenly spaced to the desired measure.

In sequence of operations I have followed the Hanigan design but in mechanical structure my machine is a radical departure therefrom.

My machine is constructed to use a matrix plate substantially made and bearing on one face, one, two or more fields of matrix characters capable of being brought to a casting position by a two-way movement of the matrix plate in parallel relation to a type

body mold, each field of characters having corresponding character representation on the key-board whereby the fields of characters may be multiples of those represented by the key-board. The characters of each field are arranged with respect to their size relations from the top to the bottom of the matrix plate, thus a comma, period, hyphen, et cetera, are placed in a vertical row so that the mold cavity sized for the first character of each vertical row shall be common to all characters of that row, variations of type size being provided for in the horizontal rows. On the reverse side of the matrix plate cone shaped recesses are properly located by which the different characters are accurately positioned, by a locking pin, with the mold cavity.

The start of the matrix plate is made from a normal position and stops, directly controlled by the manipulation of the key-board are provided to arrest the movement of the matrix plate in two directions and position the desired character with the mold cavity.

I have provided a set of stops to arrest the vertical flight of the matrix plate, and select a horizontal line of matrix characters and a second set of stops to arrest the horizontal flight of the matrix plate across a stop field, and select a vertical line of matrix characters, both stops being directly set or released by the manipulation of the key-board and automatically returned after each cast.

I have provided for a matrix plate having two or more fields of characters, arranged in rows in one direction with regard to their size relations and in rows in another direction without regard to their size relations, character representation on the key-board for each field, so that the stops, controlled by the manipulation of the key-board, set to position any selected character of any selected field, will be used to position the correspondingly located character of any other field. This is brought about by the adjustment of the matrix plate, to bring any selected field of matrix characters into use, without disturbing the primal arrangement of the stops which arrest the flight of the matrix plate in two directions.

The machine hereinafter described is constructed with a matrix plate having two fields of eighty-four characters each, making one hundred and sixty-eight characters in all. The characters of each field so represented are divided into twelve vertical rows across the matrix plate with the characters of each vertical row of substantially the same size and into seven horizontal rows in which the matrix characters may be of different sizes. This division of type characters has been found practical in the field of actual use.

By dividing the matrix plate into two

or more fields, and providing suitable shifting mechanism for bringing any field into use, a key-board bearing eighty-four matrix characters will produce as many multiples of eighty-four characters as there may be fields on the matrix plate, without varying the primal arrangement of the parts, and as the matrix plate passes across the stop field in a fixed path in one direction, and, as the stops of the matrix plate, in the other direction, are shifted with it, no complications can arise by the introduction of a matrix plate having as many fields as desired.

The matrix plate is, in its normal position, under tension and is released only by the operation of the key-board. In operation the touching of a key on my machine simultaneously adjusts two stops, then releases the matrix plate, following which the clutch is thrown into contact and the resultant actions produce a type body bearing on its face the desired character. In this respect my machine differs from those heretofore using a matrix plate, in all of which the actions above enumerated are produced through controlling devices, generally secured by one machine, termed a key-board or indicating machine, the product of which is a paper strip having perforations in combination, which strip when placed in a second machine, termed a casting machine, operates, either through magnets or compressed air, to indicate the stops, release the matrix plate, and produce the desired type body.

I have sought to construct a machine in which the several actions are produced without those intermediaries, and believe myself the first to devise a machine for the production of type bodies in any desired order, by means of a matrix plate in which stops for the two-way movement of the matrix plate, its release, and resulting operations of casting and assembling type bodies are wholly brought about by the ordinary manipulation of the key-board.

In devising a mechanism whereby I am enabled to construct a matrix plate having two or more fields of characters, each character of each field being independently usable in combination with each other, I have not only simplified the construction of the machine for the production of type in sequential order, but I have increased the scope of machines of this class in the same proportion as I have increased the number of type fields displayed on my matrix plate.

Other novel features of my machine are the type mold, and means for adjusting the same, a type body recessed to conform to my spacer, spacers and means for handling the same, and the assembling, justifying, and locking of the type line, all of which will appear in the following description. I have

however refrained from introducing into this application the means of combining a locking strip in the justified line and the consequent assemblage and swaging of the completed line, that feature still being the subject of exhaustive experiment, whether to cast a formed locking strip of the desired length as indicated in the Hanigan patent or make the locking strips, in a secondary machine, and then combine them into my line, or to use metal ribbon, wound on spools, passing the same into my machine and using so much of it as to fully lock the line.

For an understanding of the invention reference is to be had to the following description and to the accompanying drawings, in which:—

Figure 1 is a plan view of the top of the machine showing the relative position of the various parts. Fig. 2 is a front elevation of the machine. Fig. 3 is an elevation of the left side of the machine. Fig. 4 is a rear elevation of the machine. Fig. 5 is an elevation of the right side of the machine. Fig. 6 is a front elevation of the upper part of the machine, on a larger scale than the preceding views, with the key-board removed, and the bed, and the top of the pedestal in section. Fig. 7 is a rear elevation of the parts shown in Fig. 6, with the melting pot removed and the line assembling box partly broken away. Fig. 8 is a vertical section of the upper part of the machine on the line *a-a* Fig. 1. Fig. 9 is a vertical section of the same part of the machine as shown in Fig. 8 on the line *b-b* Fig. 1. Fig. 10 is a vertical section of the key-board on the line *c-c* Fig. 1. Fig. 11 is a vertical section of the key-board on the line *d-d* Fig. 1. Fig. 12 is a vertical section of a part of the key-board, showing the top key-board plate, two character keys and key stopping plates, one key stopping plate being positioned to engage with its respective character key and the other key stopping plate disengaged from its respective character key. Fig. 13 is a perspective view of part of the key-board mechanism. Fig. 13^a is a detail view of one of the spring pressed pawls and a part of the comb shown in Fig. 13. Fig. 14 is a detail view of one of the key rod stopping pins. Fig. 15 is a plan view of the horizontal stopping plate selectors. Fig. 16 is a rear elevation of the construction shown in Fig. 15, with the selector slide partly broken away. Fig. 17 is a perspective view of part of two horizontal stopping plate selectors. Fig. 18 is a perspective view of one of the operating cams and a part of one of the key-board rock shafts for the horizontal stopping plate selectors. Fig. 19 is a plan view of the shift plate, with the supported parts removed, the shift plate being partly broken away to show the antifriction roll-

ers. Fig. 20 is an end elevation of the shift plate and operating means showing the normal position of the parts. Fig. 21 is a similar view to Fig. 20, showing the operated position of the parts. Fig. 22 is a section on the line *e-e* Fig. 19. Fig. 23 is a perspective view of a part of the bed showing one of the runways. Fig. 24 is a plan view, partly in section, showing the field shift, the vertical and horizontal stops, the matrix plate and matrix plate carriage, and the matrix plate elevator, the matrix plate in this view being in its normal position. Fig. 25 is a similar view to Fig. 24, with the matrix plate at the casting position. Fig. 26 is a rear elevation of the construction shown in Figs. 24 and 25, with the parts in the same position as in Fig. 25. Fig. 27 is a perspective view of the field shift, the matrix plate elevator, a section of the vertical stopping comb and stopping plates, and the elevator releasing slide, the field shift being in its elevated position. Fig. 28 is a similar view to Fig. 27, with the field shift in its lowered position. Fig. 29 is a side elevation, partly in section, of the parts shown in Figs. 27 and 28, combined with the elevator lifting mechanism, the latter being shown in the act of raising the elevator. Fig. 30 is a vertical section on the line *f-f* Fig. 29. Fig. 31 is a horizontal section on the line *g-g* Fig. 29. Fig. 32 is a detail view showing the means for limiting the motion of the elevator rock shaft. Fig. 33 is a perspective view of the vertical stopping plate comb, stopping plates, stopping plate selectors, and the stopping plate return mechanism. Fig. 34 is a view of the same parts shown in Fig. 33, looking at them from the opposite side. Fig. 35 is a perspective view of the horizontal stopping plates, the type body mold, and associated parts, with part of the type body mold and its adjusting mechanism broken away. Fig. 36 is a perspective view partly in section of the same parts shown in Fig. 35, looking at them from the opposite side. Fig. 37 is a vertical, section of the construction shown in Figs. 35 and 36, with the mold and its related parts omitted. Fig. 38 is a perspective view of the wedge which determines the width of the mold cavity. Fig. 39 is a front elevation of the matrix plate carriage and the matrix plate. Fig. 40 is a rear elevation of the construction shown in Fig. 39. Fig. 41 is a vertical section on the line *a-a* Fig. 39. Fig. 42 is a detail view of the reverse face of the matrix plate, showing the centering recesses. Fig. 43 is a detail view of the matrix face of the matrix plate showing the vertical and horizontal rows of matrix characters. Fig. 44 is a side elevation of the matrix plate. Fig. 45 is a section on the line *h-h* Fig. 6, with the parts in their normal position. Fig. 13?

46 is a similar view to Fig. 45, with the parts at the casting position. Fig. 47 is a rear elevation showing the type body mold, the type transfer and spacer box. Fig. 48 is a plan view of the parts shown in Fig. 47. Fig. 49 is an end elevation of the type body mold. Fig. 50 is a vertical section on the line $i-i$ Fig. 48. Fig. 51 is a vertical section on the line $j-j$ Fig. 50. Fig. 52 is a front elevation of the mold showing the means for raising, lowering, and tilting the top mold part. Fig. 53 is a perspective view of the mold part in a segregated condition. Fig. 53^a is a detail view of one of the mold sides on a larger scale than the preceding view. Fig. 54 is a plan view of the melting pot and the nozzle actuating means. Fig. 55 is a side elevation of the melting pot shown in Fig. 54. Fig. 56 is a detail view of the nozzle. Fig. 57 is a detail view of the nozzle actuating yoke. Fig. 58 is a section of part of the type body mold and melting pot, showing the nozzle alined with the mold cavity but separated from it. Fig. 59 is a similar view to Fig. 58, with the nozzle locked against the type body mold. Fig. 60 is a perspective view of the operating means for the plunger of the melting pot. Fig. 61 is a perspective view of the type transfer carriage and carriage actuating mechanism. Fig. 62 is a rear elevation, and Fig. 63 is a side elevation of the secondary type transfer. Fig. 64 is a detail view of the shuttle for the secondary type transfer. Fig. 65 is a detail view of the secondary type transfer bracket and shuttle lifter. Fig. 66 is a side elevation of the spacer box and spacer lifting mechanism. Fig. 67 is a vertical section of the spacer box and a part of the line assembling box. Fig. 68 is a horizontal section on the line $k-k$ Fig. 67, with the spacers removed. Fig. 69 is a perspective view of one of the spacers. Fig. 70 is a perspective view of the line assembling box and the aliner box. Fig. 71 is an end elevation of the line assembling box. Fig. 72 is a longitudinal section on the line $l-l$ Fig. 71. Fig. 73 is a section on the line $m-m$ Fig. 71, looking at the parts from the opposite side to Fig. 72. Fig. 74 is a perspective view of the auxiliary line carriage. Fig. 75 is a section on the line $o-o$ Fig. 74. Fig. 76 is a horizontal section lengthwise of the line assembling box on the line $p-p$ Fig. 70. Fig. 77 is a section on the line $q-q$ Figs. 70 and 76. Fig. 78 is a vertical section through one of the aliner box sides on the line $r-r$ Fig. 70. Fig. 79 is a perspective view of the line carriage. Fig. 80 is a longitudinal section on the line $s-s$ Fig. 79. Fig. 81 is a cross section on the line $t-t$ Fig. 80. Fig. 82 is a perspective view of the justifying mechanism. Fig. 83 is a plan view of the clutch setting mechanism. Fig. 84 is a side ele-

vation of the construction shown in Fig. 83, with the parts partly in section. Fig. 85 is a perspective view of the segregated parts of the clutch setting slide. Fig. 86 is a section of the clutch members on the line $u-u$ Fig. 83. Fig. 87 is a side elevation of the driving clutch member. Fig. 88 is a side elevation of a driven clutch member. Fig. 89 is a section on the line $v-v$ Fig. 83. Fig. 90 is a plan view of a line of type bodies locked in a composed and justified condition by a locking strip. Fig. 91 is a perspective view of a type body. Fig. 92 is an end view of the type body shown in Fig. 91, with the locking strip in the dove tail groove. Fig. 93 is a perspective view of the locking strip shown in Fig. 90. Like characters of reference refer to like parts throughout the specification and drawings.

In the following description the organized machine will be generally outlined with the parts arranged in groups and described as nearly as possible in the order in which the sequence of actions occurs. These groups will later be described under the sub-headings used to designate the groups of parts, the groups being indicated by alphabetical letters, and the parts of the groups by numerals.

General construction of the machine, (see Figs. 1, 2, 3, 4, 5, 6, 7, 8 and 9.)—I have arranged the parts of my machine so that the operation originates with the pressing of a finger key and ends when the cycle of action is completed. Starting at the keyboard C, the pressing of a finger key through an intermediate means sets the vertical and horizontal stops for the vertical stopping plate mechanism I and horizontal stopping plate mechanism II respectively to arrest the movement of the matrix plate in a vertical direction and the movement of the matrix plate carriage and matrix plate in a horizontal direction, and co-incident with the setting of the horizontal stop the pressing of the finger key results in the setting of the means determining the type body size of the type body mold. Succeeding the setting of the vertical and horizontal stops the pressing of the finger key results, in the release of the matrix plate for its flight from its normal to its casting position, in the setting of the clutch by which the operable parts are set in motion to produce the type body ejecting it from the type body mold, and transferring it to the line assembling box where the spacers are introduced between the type bodies. I can obtain these results by various modifications of the machine hereinafter described and shown in the accompanying drawings but I have found in the field of actual use that the present machine will not only accomplish these results in a highly satisfactory manner but

that it is so simply constructed and so easily operated that no complications under normal conditions of use can arise.

The key-board C is supported on the elevated offset B' forming part of the bed B and the bed is supported by the pedestal A. On the bed, in rear of the key-board, is the shift plate D actuated by the revolution of the high speed shaft E. The high speed shaft E is driven from the motor F by an intermediate gearing G when the clutch mechanism has been set for that purpose by the operation of the key-board.

On the shift plate D are, the horizontal stopping plate mechanism H, the vertical stopping plate mechanism I, the field shift mechanism J, the matrix plate elevator mechanism K, and the high speed shaft clutch mechanism L, and supported by the field shift J is the matrix plate mechanism M. In rear of the horizontal stopping plate mechanism H is the mold mechanism O, the melting pot mechanism P, the mechanism Q for determining the type body size of the type body mold, and in rear of the vertical stopping plate mechanism I is the type transfer mechanism R. At the side of the type transfer mechanism R is the spacer mechanism S and adjoining the spacer mechanism is the line assembling mechanism T and line carriage U. To the structure of the line assembling mechanism is hinged the type aliner mechanism V and associated with the line assembling mechanism is the justification mechanism W. This arrangement of the parts brings the control of the machine directly within the range of the key-board and the intermediate mechanism operated by the actuation of the finger keys.

The term vertical stopping plate and vertical stopping plate mechanism is employed to designate the means arranged to arrest the vertical flight of the matrix-plate as contra-distinguished from the means arranged at right angles thereto to arrest the horizontal flight of the matrix plate and termed the horizontal stopping plate and the horizontal stopping plate mechanism.

Key-board mechanism, (see Figs. 1, 2, 3, 4, 5, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17 and 18.)—In the key-board are eighty-four character keys and one spacer key. The character keys are arranged in seven parallel rows of twelve keys each, extending lengthwise of the key-board, with the keys of each row alined with those of the other rows to form twelve parallel rows, of seven keys each, extending crosswise of the key-board and transverse to the lengthwise rows.

The matrix plate 42 may have one or more fields of matrix characters which are arranged in twelve vertical rows and seven horizontal rows, corresponding with the arrangement of the key-board, in each field.

The matrix characters of each vertical row are arranged with regard to size relation, but the matrix characters of one vertical row may be of a different width from those of the other vertical rows and consequently the matrix characters of the horizontal rows need not be of a uniform size. The twelve transverse rows of keys correspond to the twelve vertical rows of characters on the matrix plate and the seven lengthwise rows of keys correspond to the seven horizontal rows of matrix characters.

The key rod 3 of each character key operates through a slot 4 in the top key-board plate 5 and through a slot 6 in the inner key-board plate 7. The slots 4 and 6 for each key rod are vertically alined and their sides serve as guides for the movements of the key rods. Below the inner key-board plate 7 are key rod stops 8 alined with their respective key rods and engaging the lower ends of the key rods are springs 9. The lower end of each key rod extends through the inner key-board plate and enters the slot 16 in its key rod stop 8, the depth of the slot determining the length of the downward movement of the key rod.

The length of each slot 4 is slightly in excess of the widest part of its respective key rod to permit of the key rod being inserted in or removed from the key-board without dismantling the latter or interfering with the primal arrangement of the other keys. Each key rod is provided with a stopping shoulder 10 below the top key-board plate 5 which engages with a key rod stopping plate 11 movably connected to the inner surface of the top key-board plate. To simplify the construction of the key-board a key rod stopping plate 11 is provided for each row of the seven rows of keys extending lengthwise of the key-board and each of these key rod stopping plates is secured to the inner surface of the top key-board plate 5 by the stopping plate screws 12 extending through two elongated slots 13, which permit the stopping plates 11 to be moved in the direction of the key rods 3 when the stopping plate is being positioned to engage with the stopping shoulders 10 and away from the key rods 3 to permit of the removal of the key rods from the key-board. Between the stopping shoulders 10 and the character buttons 14 on each key rod is a stopping plate recess 15 providing a clearance for the movement of the key rod past the key rod stopping plate 11. Should it be necessary to remove a key rod the stopping plate screws 12 can be moved in the stopping plate slots 13 until the stopping plate is clear of the path of the stopping shoulder 10. The key rod can then be withdrawn from and replaced in the key-board and the key rod stopping plate 11 can then be moved into and locked, by the stopping

plate screws 12, in a position where it will engage with the stopping shoulder 10. Journaled in the key-board frame and extending lengthwise of the key-board are seven stopping plate rock shafts 22, there being one stopping plate rock shaft for each of the seven lengthwise rows of keys. Fixed on each rock shaft 22 are twelve crank arms 23 for the key rods of its respective row. Each key rod is provided with a shoulder 24 to engage with a roller 25 journaled on its respective crank arm 23. Each rock shaft 22 is provided with a crank arm 26 contained in a vertical slot 27 in its respective horizontal stopping plate selector 28. When any key is pressed the shoulder 24 of the key rod engages with its roller 25 and presses its crank arm 23 downward, causing the corresponding rotation of the rock shaft 22. This rotation of the rock shaft 22 causes the crank arm 26 to engage with the side of the vertical slot 27 and move the vertical stopping plate selector 28 toward the vertical stopping plate comb 30. The vertical stopping plate selector 28 has a finger 32 for each field of matrix characters represented on the matrix plate, and in the present application is shown to be provided with two fingers 32 as the matrix plate in the present machine is shown to have two fields of matrix characters. Each finger 32 of each vertical stopping plate selector 28 is positioned to engage the same vertical stopping plate when the vertical stopping plate comb is shifted to present either the upper or the lower field of matrix characters to the type body mold. A vertical stopping plate is employed for each row of keys extending lengthwise of the key-board and it is therefore necessary, in the present instance, to use seven vertical stopping plates, the bottom one 29 of which is immovable and is permanently located in the path of the matrix plate 42 and the remaining six are movable and capable of being selectively projected by the vertical stopping plate selectors 28 into the path of the matrix plate 42 or being returned into the vertical stopping plate comb 30 by the action of the vertical stopping plate return mechanism hereinafter described. The permanent stopping plate 29 is secured to the vertical stopping plate comb 30 and the movable stopping plates 31 are contained in the comb 30 above the permanent stopping plate.

When any key rod, of the lengthwise row at the front of the key-board, is pressed its shoulder 24 engages with its crank arm 23, moving the latter downward and turning its respective rock shaft 22 in the direction indicated by arrow in Figs. 8 and 9. This action of the rock shaft causes the crank arm 26 to push the vertical stopping plate selector 28 toward the vertical stopping plate comb 30 until the stopping plate se-

lector finger 32 comes into contact with and projects its corresponding stopping plate 31 into the path of the matrix plate 42 to arrest the flight, in a downward direction, of the matrix plate, when the matrix plate elevator is released as hereinafter described.

Journaled in the key-board frame are twelve rock shafts 34 disposed so that there is a rock shaft for each of the twelve transverse rows of keys and tensioned by springs 37 connected to pins 34^a projecting from the rock shafts and to hooks 38 secured within the key-board frame. Fixed on the rock shafts 34 are crank arms 35 projecting into the crank arm recesses 36 of the key rods 3.

The crank arms 23 are continuously engaged by the shoulders 24 and the crank arms 35 are continuously engaged by the shoulders 39 of the key rods 3. When a key rod is pressed its initial action is to move the crank arms 23 and 35 in the direction indicated by arrows in Figs. 8 and 9, and turn the stopping plate rock shafts 22 and 34 in the shown direction. When the rock shafts are turned in the shown direction, a vertical stopping plate 31 is projected into the path of the matrix plate to arrest its vertical flight in a downward direction as the matrix plate elevator descends and a horizontal stopping plate 154 is projected to arrest the horizontal flight of the matrix plate carriage as the matrix plate moves to the casting position, its movement being in a plane in parallel relation with the type body mold.

The action of the key rod subsequent to the setting of the vertical and horizontal stopping plates continues the movement of the vertical stopping plate selector 28 until the heel 40 of the latter engages and pushes the elevator releasing slide 41 in the direction of the matrix plate 42. The elevator releasing slide 41 is provided with an arm 43 which during the initial movement of the elevator releasing slide engages a pin 44 projecting from the elevator detent pawl 45 and moves the pawl 45 to release the elevator so that the latter can descend from its elevated position until arrested by the engagement of the matrix plate with the projected vertical stopping plate as hereinafter described. The continued movement of the key rod 3 and vertical stopping plate selector 28 to the limit of the stroke causes the elevator releasing slide 41 to actuate a clutch releasing means so that the high speed shaft E may revolve unitedly with the drive wheel as hereinafter described.

In the comb 20 below the inner key-board plate 7 is a shaft 47 on which are loosely mounted seven spring pressed pawls 21, one pawl being located beneath each vertical stopping plate selector 28 with an arm 48^a projecting into a slot 28^a in its respective vertical stopping plate selector 28. Bearing against the arm 48^b of each pawl 21 and

against the comb 20 is a spring 49. When the vertical stopping plate selector is actuated to project a vertical stopping plate into the path of the matrix plate, the corresponding
 5 pawl 21 is turned to compress the spring 49 which remains compressed until the key rod is released and is restored to its initial position by the spring 9. The spring 49 then operates to restore the pawl 21 and the stop-
 10 ping plate selector 28 to their normal positions, the return movement of the stopping plate selector being arrested by a stop 50 at the front of the key-board C.

Within the key-board C is a vertical stop-
 15 ping plate selector comb 51 and in the bracket 54 at the rear of the key-board is a vertical stopping plate selector comb 51^a, alined with the vertical stopping plate selector comb 51. The vertical stopping plate
 20 selectors 28 are slidably mounted in these last mentioned combs 51, 51^a, and formed in the vertical stopping plate selectors 28 are elongated slots 52 for the antifriction rollers
 25 53 supporting the vertical stopping plate selectors and facilitating their sliding movement. Fastened to the bracket 54, and at right angles with the rock shaft 34, is a slide box 55. The rock shafts 34 are journaled in
 30 55 and their adjacent ends are formed with tongues 56 to enter corresponding recesses 57 in the cam cranks 58. Eleven of the cam cranks 58 are provided with cams 59 which operate in cam recesses 60 in eleven of the
 35 slides 61. The remaining cam crank is provided with a cam 59^a which operates directly upon the arm of its respective bell crank 145 releasing the latch bolt 141 from the drop bar 138. The slides 61 reciprocate
 40 within the slide box 55, six of them having their initial movement to the left, and the remaining five to the right. Eleven of the slides 61 are provided with fingers 62 and these fingers 62 and the cam 59^a engage the
 45 bell cranks 145 and operate the latch bolts 141 in the manner hereinafter described under the sub-heading "Horizontal stopping plates and horizontal stopping plate actuating mechanism".

50 When any key rod of the first five transverse rows of keys from the right of the key-board is operated, it moves its respective stopping plate rock shaft 34 to the right and causes the initial reciprocating move-
 55 ment of its respective slide 61 in that direction. The slide 61 actuates its bell crank 145 and releases its drop bar 138 to project its horizontal stopping plate 154 into the path of the matrix plate carriage.

60 The operation of any key rod in the sixth transverse row from the right turns its respective rock shaft 34 and cam 59^a to the left, the cam 59^a acting directly upon its respective bell crank 145 and actuating the
 65 latter to effect the release of its horizontal

stopping plate. The key rods of the remaining six transverse rows operate their respective slides 61 to the left in a manner corresponding to the operation of the five transverse rows operating to the right. 70

The immediate results attained from touching a key on my key-board are as follows:—
 to actuate the rock shaft 22 to transmit motion to the vertical stopping plate selector 28, causing it to project a vertical stopping
 75 plate forward; to actuate the rock shaft 34, to transmit motion to the slide 61 causing it to release a horizontal stopping plate; to engage, through the vertical stopping plate selector 28, an elevator releasing slide 41
 80 causing it first to release the matrix plate elevator that the matrix plate may descend to its projected stop and second to release a clutch that sets in motion the mechanism for the subsequent action of adjusting the
 85 matrix plate and reproducing the character therefrom. In operation these actions take place almost simultaneously, although timed as noted, and the effect in summary is, that the action secured from touching a key
 90 on my key-board is to project at once stops into the path of a two-way moving matrix plate to arrest its movement in two directions, release and adjust the same preparatory to securing a reproduction of the indi-
 95 cated character.

Shift plate and shift plate actuating mechanism, (see Figs. 1, 3, 4, 5, 6, 7, 8, 9, 19, 20, 21, 35, 36, 37, 45, 46, 54 and 55.)—
 100 On the bed B, in rear of the key-board C and attached thereto are two runways 511 and supported above the runways 511 is the shift plate D. The shift plate carries the movable parts of the machine for the man-
 105 ipulation of the matrix plate and interposition between the shift plate D and the runways 511 are antifriction bearings 512 which carry the shift plate as it reciprocates during the revolution of the high speed
 110 shaft E. In the shift plate D are elongated slots 514, 514^a, extending laterally of the shift plate, and contained in the slots 514, 514^a are antifriction rollers 515, 515^a, fastened to the runways 511 by studs 516, 516^a,
 115 the purpose of the antifriction rollers being to maintain the parallel movement of the shift plate. The studs 516 are provided with buttons 518 overlapping the edge of the slots 514 and preventing the front end
 120 of the shift plate being lifted from the runways 511. The antifriction rollers 515^a are covered by plates 519 and fastened to the runways are springs 520 bearing on the plates 519 and preventing the rear end of
 125 the shift plate being lifted from the runways. The springs 520, where they engage with the plates 519 are curved to enter corresponding grooves 521 in the plates 519 and steady the shift plate during its move-
 130 ments. At the front of the shift plate are

buffers 522 extending through apertures in the elevated part B' of the bed and engaging with the buffer springs 523 secured to the bed below the key-board, the purpose of the spring pressed buffers being to cushion the return of the shift plate to its normal position. Fulcrumed to the runways 511 below the high speed shaft E are the front ends of the toggles 524, the rear ends of the toggles 524 being fulcrumed to the shift plate D. The toggles 524 are provided with rollers 525 engaged by cams 526 on the high speed shaft E. When the cams 526 engage the rollers 525 they straighten the toggles 524 and move the shift plate in what may be termed its initial direction. To move the shift plate in the reverse direction, the toggles in front of the high speed shaft are provided with arms 88 having rollers 527 engaging cams 528 fixed on the high speed shaft E to bend the toggle. During the revolution of the high speed shaft the cams come into engagement with the rollers and straighten the toggles. The straightening of the toggles moves the shift plate in the direction indicated by arrows in Figs. 20 and 21 and holds the shift plate in that position until the projections of the cams 526 pass the rollers 525. The projections of the cams 528 then engage with the rollers 527 and bend the toggles 524 as shown in Fig. 20, moving the shift plate in the opposite direction to that indicated by arrow. The shift plate is provided with bearings 116 in which is mounted the high speed shaft E carried back and forth during the reciprocating movements of the shift plate to maintain its fixed relation with the other parts mounted thereon which it is not necessary to describe in detail under the present sub-heading as they are hereinafter specifically described under their respective sub-headings.

The purpose of mounting various parts on the shift plate D is to secure to the matrix plate 42 a movement against the mold cavity to bring its indicated character into contact therewith and to retract the matrix plate after the character has been cast, the said movement to and fro, being organized that all the various parts concerned in the manipulation of the matrix plate, return of the stops, and resetting of the parts, are not disturbed in their relations either to their source of action, the high speed shaft, or the object of their action, the matrix plate.

Field shift, matrix elevating mechanism and vertical stops, (see Figs. 1, 3, 4, 5, 6, 7, 8, 9, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 45 and 46.)—On the shift plate D are two standards 177, 177^a, having in their inner faces vertical slideways 178 for the field shift slides 179, and rigidly attached to and connecting together the lower parts of the slides 179 is the vertical stopping plate comb

30. At the top of the standards 177, 177^a, are bearings 180 for the rock shaft 181 and projecting from the rock shaft 181 vertically above the slides 179 are crank arms 182 pivotally connected by links 183 to the slides 179, the rock shaft 181 being provided with a crank 184 by which it can be turned to change the matrix field presented for use. Journaled in bearings 186 which are a part of the slides 179 is the elevator rock shaft 187 and projecting from the elevator rock shaft 187 are the elevator rock shaft arms 188 having their free ends adjacent to the matrix plate 42 forked to receive the blocks 189 on the matrix plate shaft 190. The ends of the matrix plate shaft 190 are mounted in the matrix plate slides 191 vertically movable in the slideways 192 forming part of the field shift slides 179 to control the movement of the matrix plate shaft in a fixed pathway. Formed in the field shift slides 179 are vertical grooves 193 in which are movable the pins 194 of the elevator slides 195. The elevator slides 195 are provided with horizontal grooves 195^a for the slide blocks 196 pivotally connected with the rock shaft crank arms 188 by studs 196^a. Connected to the pins 194 and to the bottom of the vertical grooves 193 are springs 197 accelerating the action of the elevator-slides and the elevator rock shaft crank arms 188 during the downward flight of the matrix plate 42. The matrix plate 42 is provided with hubs 198 loosely encircling the matrix plate shaft 190 for the horizontal movement of the matrix plate on the matrix plate shaft during the flight of the matrix plate carriage to the horizontal stop. The elevator slides 195 are provided with lifting shoulders for each field of characters on the matrix plate. In the present instance the matrix plate is shown to have two fields of characters and one of the elevator slides is therefore provided with two lifting shoulders 199, 199^a, either of which may be positioned to be engaged by the lifting dog 200. The lifting dog 200 is fulcrumed to the lifting slide 201 vertically movable in guideways 202 in the standard 177^a, and is connected by a link 203 to the lever 204. The lever 204 is fulcrumed to a bearing 205 on the shift plate D and is actuated by a cam 206 on the high speed shaft E.

If the lower matrix field is positioned for use the lower lifting shoulder 199^a, as shown in Fig. 27, will be engaged by the lifting dog 200 when the lifting slide rises under the influence of the cam 206 and the lever and link connections. If the upper matrix field is positioned for use the upper lifting shoulder 199 will be engaged by the lifting dog 200 and raised in the same way as previously stated. Connected to the lifting slide 201 and to the bottom of the guideway 202 are springs 207 to lower the lifting

slides and lifting dog when the lever is released by the cam 206, the lever 204 descending with the lifting slide until its roller 208 comes into contact with the depressed part of the cam 206 for the next operation of the machine. Fastened to the guideway 202 in rear of the lifting dog 200 is an interfering block 210 having a beveled face engaging a correspondingly beveled face of the lifting dog. This interfering block is so positioned with relation to the lifting dog and the elevator slideway that a spring 209 will hold the lifting dog 200 clear of the path of the lifting shoulders 199, 199^a, when the lifting dog is in its rest position so that the lifting shoulder 199^a can move with the field shift slide 179 when the field of matrix characters is being changed without impedence by the lifting dog 200.

If the lower field of matrix characters is presented for use, the field shift is raised into the position shown in Fig. 27, which may be termed its upper position, and when the upper field of matrix characters is presented for use the field of shift is lowered into the position shown in Fig. 28, which may be termed its lower position. In the position shown in Fig. 27, the lifting dog 200 will engage with the lifting shoulder 199^a and when the field shift is in the position shown in Fig. 28, the lifting dog will engage with the shoulder 199. During the revolution of the high speed shaft the cam 206 raises the lifting lever from a substantially horizontal, to an inclined, position, which in turn elevates the lifting slide and raises the lifting dog. During the upward movement of the lifting dog, the interfering block throws the latter into the path of the lifting shoulder to engage it and raise the elevator slides to their elevated position where they are held by the spring pressed pawl 45 engaging with the pawl catch 211. The spring pressed pawl is fulcrumed to the field shift 179 and is provided with a pin 44 to engage with the arm 43 carried by the elevator releasing slide 41. When the elevator is in its raised position the elevator rock shaft arms hold the matrix plate suspended so that its bottom edge is slightly above the topmost stopping plate 31, to permit of any selected stopping plate in the vertical stopping plate comb being projected into the path of the matrix plate to arrest its vertical flight in a downward direction. To limit the downward movement of the elevator when the matrix plate is removed, the rock shaft 187 is provided with a collar 212 having a recess 213 in its peripheral surface into which a stopping pin 214 projects from the adjacent bearing 186.

The action of the field shift, elevator, and vertical stopping plates may be briefly summarized as follows:—When the matrix field is selected, the rock shaft 181 is turned to

bring the selected field into the operative position by raising the field shift slides into the position shown in Fig. 27, or lowering them into the position shown in Fig. 28. The change in the position of the field shift slides causes a corresponding change in the position of the matrix plate elevator, the matrix plate and the vertical stopping plate comb 30 all of which move unitedly with the field shift during the change of the matrix field, but all of which maintain their primal arrangement with regard to each other.

Starting with the pressing of a finger key in the keyboard, the action of the parts can be traced as follows:—At the commencement of its movement the key rod, through the intermediate key-board mechanism moves the vertical stopping plate selector 28, until the selector finger comes into contact with its respective stopping plate 31 and pushes the stopping plate into the path of the matrix plate to arrest the downward flight of the latter when the matrix plate elevator is released. The action of the key rod continues the movement of the vertical stopping plate selector until the heel 40 of the latter comes into contact with the elevator releasing slide 41 and moves it in the direction indicated by arrow in Fig. 28, until its arm 43 engages with the pin 44 and disengages the detent 45 from the catch 211 for the descent of the elevator slides. The downward movement of the elevator slides lowers the elevator rock shaft arms and the matrix plate shaft until the matrix plate is arrested by the vertical stopping plate projected into its path, these parts remaining in their lowered position until the type body is cast. The cam 206 then actuates the lever 204 to raise the lifting dog and bring it into engagement with the lifting shoulder for the return of the matrix plate elevator to its elevated position. When the elevator slides have attained their elevated position the cam 206 releases the elevator lever 204 and permits it and the lifting slide, lifting dog and link, to descend under the influence of the spring 207, the lifting dog 200 under the influence of the spring 209 moving out of the path of the lifting shoulders when these parts are restored to their normal position. When the key rod is released, it and the vertical stopping plate selector return to their normal position and the elevator releasing slide 41 is restored to its initial position by the action of a cam on the high speed shaft hereinafter described. When the elevator releasing slide is returned to its initial position the pawl 45 is pressed by a spring 45^c to engage with the catch 211 when the elevator slides are raised, the pawl 45 oscillating on the fulcrum stud 45^a for that purpose.

The parallel movement of the vertical stopping plates 31 is maintained by links 162 pivoted to the stopping plate comb 30

and engaging in annular slots in the stopping plates so that when a stopping plate is projected from, or returned to, the stopping plate comb, its movement will be uniformly controlled by the links.

I have herein described a mechanism adapted to adjust a matrix plate vertically to select any one line of characters passing horizontally across the matrix plate and to shift the matrix plate from the first to the second field of characters or vice versa. It is to be understood however that the same or similar mechanism may be used for a matrix plate using more than two fields of characters and that I may increase the number of vertical stops to provide for a larger number of characters in each field.

Horizontal stopping plates and horizontal stopping plate actuating mechanism, (see Figs. 1, 4, 6, 8, 24, 25, 26, 35, 36, and 37.)—On the shift plate D are two standards 133, 133^a, connected together by the tie plate 134, forming the bottom member of the plunger comb 135, and above the comb 135 is the latch bolt comb 136 in rear of which is a vertical slideway for the drop bars 138. Connected to the rear face of the standards 133, 133^a and extending across the slideway 137 is a recessed guide plate 137^a preventing the displacement of the drop bars 138. In each drop bar 138 is a recess 139 for the arrester plate 147 connected to the standards 133, 133^a. The latch bolt 141 for each drop bar 138 is contained in its respective section of the latch bolt comb 136 and is pressed into engagement with its respective drop bar 138 by a spring 142. Pivoted in the comb 136 is a bell crank 145 for each latch bolt 141, one arm of each bell crank operating in a recess 146 in its respective latch bolt 141 and the other arm projecting beyond the comb and engaging with the finger 62 of its respective selector slide 61. When a selector slide 61 is actuated, its finger 62 actuates the bell crank 145 to withdraw the latch bolt from the drop bar 138. The drop bar then descends until the shoulder 139^a, at the top of the recess 139, engages the arrester plate 147, the descent of the drop bar being accelerated by a spring 148 fastened at one end to the plunger comb 135 and bearing at the other end against the top surface of the lifter lug 149 forming part of the drop bar 138. Below the latch bolt comb 136 is a shaft 140 supported at its ends by the standards 133, 133^a, and mounted on the shaft 140 is a bell crank 150 for each drop bar 138. Each bell crank 150 has a forked arm 151 which engages a lug 152 projecting from its respective drop bar 138, the other arm 153 of each bell crank engaging in a recess 153^a in its respective horizontal stopping plate 154. During the descent of the drop bar 138, the lug 152 oscillates the bell crank 150 and projects the

horizontal stopping plate 154 into the path of the matrix plate carriage, the impulse of the horizontal stopping plate being arrested when the shoulder 139^a comes into contact with the arrester plate 147. On the shaft 155, passing through the plunger comb 135, is a drop bar lifter 156, for each drop bar, engaging the under side of the lifter lug 149 of its respective drop bar and actuating each drop bar lifter is a plunger 157 slidable in its respective section of the comb 135 and which moves into the path of the cam 160 as the drop bar descends. Each plunger 157 is provided with a lug 158 against which and the end of the spring chamber in the plunger comb 135 bears a spring 159 to prevent the vibration of the plunger.

When a key rod is pressed it actuates, through the intermediate key-board mechanism, the stopping plate slide 61, bringing the finger 62 into engagement with and actuating its respective bell crank 145 to release the latch bolt from its respective drop bar which then descends until its motion is arrested by the arrester plate. The descent of the drop bar through the agency of the lug 152 and bell crank 150 projects a horizontal stopping plate 154 into the path of the matrix plate carriage and actuates the drop bar lifter 156 to position its respective plunger 157 in the path of the cam 160. During the revolution of the high speed shaft E, the cam 160 engages the plunger which has been projected beyond the plunger comb 135 and returns the plunger to the comb. The plunger during its return movement engages the arm 156^a of the drop bar lifter and actuates the latter to restore the drop bar 138 to its elevated position. When the drop bar is raised to its elevated position the spring pressed latch bolt 141, engages and locks it until it is again released by the operation of a key rod. As the drop bar 138 ascends to its elevated position the lug 152 actuates the bell crank 150 to restore the horizontal stopping plate to its normal position.

It has been herein stated that when a key rod is pressed it operates, through the intermediate mechanism, to withdraw the latch bolt from the drop bar which then descends and projects a horizontal stopping plate to arrest the horizontal flight of the matrix plate carriage. This action of the horizontal stopping plate mechanism occurs before the operation of the key rod sets the clutch for the high speed shaft.

High speed shaft clutch and clutch setting mechanism, (see Figs. 1, 3, 6, 9, 24, 27, 28, 83, 84, 85, 86, 87, 88, and 89.)—The elevator releasing slide 41 is mounted on the slide bed 41^a and fulcrumed on the slide bed 41^a is a bell crank 254, having one arm 254^a engaging in the recess 41^b, in the elevator releasing slide, and the other arm 254^b engaging in a

groove 255^a in the clutch setting slide 255. When a key rod is pressed, the vertical stopping plate selector 28 moves the elevator releasing slide 41 in the direction of the vertical stopping plate comb 30. This movement of the elevator releasing slide oscillates the bell crank 254 and moves the clutch setting slide 255 in the direction indicated by arrow in Fig. 85, and withdraws the arm 264 from the clutch dog 256, so that the latter can engage with the ratchet teeth 257 of the driving clutch member 258. The driven clutch member 259 is fixed on the high speed shaft E and when the clutch dog engages with the ratchet teeth the high speed shaft revolves with the driving clutch member which is revolved by motion transmitted from the motor F by the sprocket wheels 260, 262, sprocket chain 261 and counter shaft 263. The details of the clutch setting mechanism are clearly illustrated in Figs. 85 to 89 inclusive, in which the clutch dog 256 is shown to be provided with an arm 256^a, engaging with the arm 264 of the clutch setting slide and an arm 256^b engaging with the ratchet teeth 257. The arm 256^a is contained in a groove 266 in the hub of the clutch member 259, and when the arm 256^b engages with the ratchet teeth 257, it locks the driving and driven clutch members together so that the driven clutch member 259 and the high speed shaft E will revolve. On the high speed shaft E is the elevator releasing slide return cam 267 (see Fig. 27) engaging with an arm 268 on the elevator releasing slide 41 to return the elevator releasing slide to its normal position. The return of the elevator releasing slide oscillates the bell crank 254 moving the clutch setting slide in the opposite direction to that indicated by arrow in Fig. 85, and positioning the arm 264 in the path of the clutch dog arm 256^a so that when the high speed shaft has completed its revolution, the arm 264 will engage with the arm 256^a and throw the clutch dog 256 out of engagement with the ratchet teeth 257. The action of the clutch dog 256, when released by the clutch setting slide 255, is accelerated by springs 269 attached at one end to the clutch setting dog 256 and held at the other in the recess 270 in the face of the driven clutch member 259 so that when the arm 264 of the clutch setting slide is removed from beneath the arm 256^a they will throw the clutch dog quickly into engagement with the ratchet teeth 257. The movement of the clutch setting slide 255 is guided by a roller 272 connected with the shift plate D by a stud 273, the roller 272 operating in a slot 271 in the clutch setting slide.

Matrix plate, matrix plate carriage and matrix plate actuating mechanism, (see Figs. 1, 3, 4, 5, 6, 7, 8, 9, 24, 25, 26, 27, 28, 29, 30, 31, 32, 39, 40, 41, 42, 43, 44, 45 and 46.)—

The matrix plate is of a substantially quadrangular shape with its vertical sides in parallel relation and has on its face one two or more fonts or fields of matrix characters, in rows in two directions for the alignment of any character of any field with the mold cavity by a two-way movement of the matrix plate, the matrix plate being continually maintained in its normal position, in motion and in its operative position in a plane parallel with the type body mold.

The characters are disposed vertically with regard to size relation and horizontally without regard to size relation, but this arrangement may be reversed and with a slight change in some of the cooperating parts the same results can be attained. The matrix plate shown in the present application has two fields of characters, each field consisting of twelve vertical rows and seven horizontal rows corresponding with the arrangement of the rows of finger keys in the key-board so that the operation of any key will indicate a correspondingly located character on the matrix plate. In the reverse face of the matrix plate is a recess 42^a, for each character, to receive the locking pin which centers the character with, and locks it against, the mold cavity. The matrix plate 42 is moved in a horizontal direction by the matrix plate carriage 216 but has vertical motion independently of the latter. This vertical movement of the matrix plate is provided for by the matrix plate carriage which has a vertical slideway 217 with projecting tongues 218 entering the grooves 215 in the sides of the matrix plate 42 and guiding the matrix plate as it moves vertically in the slideway. It has been stated herein, that the matrix plate is supported from the matrix plate shaft having vertical movement in suitable slideways and it is to be understood that the movement of the matrix plate in the slideways 217 is only limited by the movement of the matrix plate shaft in one direction and the vertical stopping plates in the other. During the change of the field of characters the matrix plate moves vertically through the slideway 217 until the selected field is brought to the operative position and during the selection of a character from the operative field the matrix plate moves in a downward direction until arrested by a vertical stopping plate and in an upward direction until the matrix plate rock shaft has attained the limit of its stroke. The matrix plate carriage moves in a fixed path horizontally across the stop field and its movement is guided by grooved idlers 220, journaled to the standards 177, 177^a, and the carriage guides 219, 219^a, extending from opposite sides of the matrix plate slideway 217. In the matrix plate carriage 216 is a horizontal slideway 221 for the buffer plate 222, and in-

terposed between the buffer plate 222 and the vertical slideway 217, are buffer springs 223. Revolvably mounted in the buffer plate 222 is a swivel plate 224 oscillatingly connecting the rock shaft lever 225 to the matrix plate carriage. The rock shaft lever 225 is fixed on the rock shaft 226, having a rock shaft crank 227 engaged by the matrix plate cam 228, fixed on the high speed shaft E. The rock shaft 226 is provided with two arms 229 having stops 230 at their outer ends, and the standard 177² above the rock shaft 226 is provided with a bracket 231 having projecting arms 232 vertically above the rock shaft arms 229. Springs 233 are connected to the bracket arms 232, at a fixed place, and to grooved collars 234 slidable on the rock shaft arms 229. The horizontal flight of the matrix plate carriage is arrested by the projection of any selected horizontal stopping plate into its path and it is necessary to provide an impelling means for the matrix plate carriage which will exert a uniform force from the commencement to the completion of its movement. It has been found in the field of actual experience that when a spring is used having sufficient strength to impel the matrix plate to the farthest horizontal stopping plate, the spring when it has a fixed connection with the rock shaft, impels the matrix plate carriage with too great a force against the horizontal stopping plates. To provide an impelling means which will move the matrix plate carriage with a uniform impelling force from the commencement to the completion of its travel, the springs 233 are connected in the manner above stated, so that when the matrix plate carriage is in its normal position, the collars 234 will be on the rock shaft arms 229 at their junction with the rock shaft. When the collars are in this position the springs have their greatest extension and consequently exert their greatest force, which is utilized to start the motion of the matrix plate carriage. As the rock shaft turns the arms 229 move upwardly and the collars 234 move outwardly on the arms, permitting the springs 233 to contract and decrease in force. As the force of the springs decreases the leverage resulting from the outward movement of the collars on the arms increases and compensates for the decreased force of the springs. By this means it is possible to impel the matrix plate carriage with a uniform force from the commencement to the completion of its flight and employ a weaker spring for that purpose than could otherwise be used. The cam 228 is positioned to quickly release the rock shaft crank 227 when the high speed shaft E commences its revolution so that the matrix plate carriage can commence its flight, to the projected horizontal stop, under the impulse of the spring 233; i. e. the

matrix plate carriage cam 228 has no detaining action on the rock shaft crank 227 and performs no function while the springs 233 are impelling the matrix plate carriage to the horizontal stopping plates. The return of the matrix plate carriage to its normal position is effected by the matrix plate carriage cam 228 coming into contact with the rock shaft crank 227 and turning the rock shaft 226 to actuate the lever 225, which during its return movement restores the matrix plate carriage to its normal position. The matrix plate carriage 216 is formed with a tongue 235 traveling in a groove 236 in the cover 237 secured to projections from the standards 133, 133^a. It has been stated in connection with the description of the shift plate and shift plate actuating mechanism that the standards 177, 177² and their associated parts, and the standards 133, 133^a and their associated parts, are mounted on and movable with the shift plate and by providing the matrix plate carriage with a tongue 235 slidable in the groove 236 of the cover 237, it is possible to employ the latter for, and impose upon it the strain of, stripping the matrix plate from the mold during the reverse movement of the shift plate, thus relieving the carriage guides of such stress.

When the clutch mechanism has been set, by the pressing of a finger key in the key-board, the high speed shaft starts its revolution and the matrix plate carriage cam then releases the rock shaft crank 227, so that the springs 233, through the agency of the rock shaft 226 and lever 225, will move the matrix plate carriage in its horizontal flight across the stop field until arrested by the horizontal stop projected into its path. The matrix plate carriage cam is timed to permit the matrix plate carriage to remain at the casting position until the casting of the type body has been performed. The matrix plate carriage cam then engages with the rock shaft crank 227 moving it and turning the rock shaft 226 so that the lever 225 will restore the matrix plate carriage to its normal position as the high speed shaft completes the cycle of its revolution, holding it there until the commencement of the next revolution of the high speed shaft to repeat the action of the matrix plate carriage actuating parts. The vertical flight of the matrix plate through the matrix plate slideway constitutes a one-way movement of the matrix plate, and the horizontal flight of the matrix plate carriage and matrix plate to the horizontal stops constitutes another one-way movement of the matrix plate, thus the matrix plate may be said to have a two-way movement directly controlled by the operation of the key-board through the medium of the intermediate mechanism and the vertical and horizontal

stops, which arrest its movement in two directions.

Matrix plate centering and locking mechanism, (see Figs. 45 and 46).—When the vertical and horizontal flights of the matrix plate are arrested by the vertical and horizontal stopping plates, the matrix character to be reproduced is positioned opposite the mold cavity 92, of the type body mold maintained in a fixed position with regard to the other parts of the machine. The width of the mold cavity is varied according to the width of the type body to be cast and it is therefore necessary to provide a centering means which will accurately position the character selected for reproduction opposite the center of the mold cavity. To do this the matrix plate has in its reverse side, a recess 42^a for each matrix character of each field.

When the vertical and horizontal flights of the matrix plate have been arrested by the vertical and horizontal stops, the recess 42^a corresponding to the positioned matrix character is alined with the conical point 239 of the locking pin 240. The locking pin is arranged transversely to the matrix plate and has reciprocating action in the locking pin chamber 241. When the point of the locking pin 240 enters a recess 42^a, it centers the positioned matrix character with the mold cavity and locks the matrix plate against the mold, thus accurately determining the position of the type character on the type body and providing for the correct alinement of all the type bodies in the assembled line when the latter is composed and justified. The locking pin 240 is released from the recess 42^a by a spring 243 bearing at one end against a shoulder 244 on the locking pin and at the other end against the spring chamber 242. The locking pin extends beyond the standard 133^a and its outward movement, under the influence of the spring 243 is arrested by a stop 245 inserted in the front end of the spring chamber 242. Fulcrumed to the standard 133^a, below the locking pin is a lever 247, one end of which is provided with a roller 248 engaged by the locking pin cam 249 on the high speed shaft E, and pivoted to the other end of the lever 247 is an arm 250 having a roller 251 engaging a plate 252 pivoted to the standard 133^a between the lever and the locking pin. The arm 250 is provided with an adjusting screw 253 by which it can be set to vary the travel of the locking pin in the direction of the matrix plate.

The first action occurring during the revolution of the high speed shaft is the release of the rock shaft crank arm 227 by the matrix plate carriage cam 228 so that the springs 233 will cause the horizontal flight of the matrix plate carriage to the horizontal stop which has been set by the operation of the finger key, after which the locking pin cam

249, by actuating a lever 247, moves the locking pin 240 into the alined recess 42^a and centers the selected character on the face of the matrix plate with the mold cavity 92, and finally the shift plate, with its associated parts are brought into position where the matrix plate will be locked against the mold until the operation of casting the type unit is performed. Subsequent action resulting from the revolution of the high speed shaft is the release of the lever 247 by the locking pin cam 249 in order that the locking pin may recede from the recess 42^a by the action of the spring 243 and finally the return of the shift plate with its associated parts to its normal position, stripping the matrix plate from the mold and permitting the lever 225 to restore the matrix plate carriage to its normal position. These actions may be briefly summarized as follows—the pressing of a finger key, in the key-board, after setting the stops controlling the vertical and horizontal flights of the matrix plate, sets in motion operable means which centers the selected character on the matrix plate with the mold cavity, locks the matrix plate against the mold until the type body is cast, and then withdraws the matrix plate from the mold and returns the matrix plate to its normal position.

Mold and mold actuating mechanism, (see Figs. 1, 4, 7, 8, 35, 36, 37, 38, 47, 48, 49, 50, 51, 52 and 53).—Broadly the mold may be said to consist of three parts. (a) an immovable bottom part to form one side of the type body. (b) an ejector which shall form another side of the type body (c) a movable top part having its end angularly disposed to form two sides of the type body. To operate these parts it is necessary that the ejector must have one movement to set a type body size for a desired character and a second movement to push the type body from the position in which it was cast to clear the mold, and that the top part shall be movably connected to close two sides of the type body mold for casting and to open for clearing the mold for the succeeding cast. These features may be carried out in various ways but a convenient means which has been found practicable in the field of actual experience is the construction of a mechanism substantially as follows in which the mold consists of a bottom mold part 274^a, top mold part 274^b with the angularly disposed side 274^c and the ejector 313.

The bottom mold part 274^a is seated on the mold supporting structure 275, bolted to the bed B, and provided with water channels 274 connected with flow pipes 238. The top surface of the bottom mold part 274^a is formed with a dovetail core 276 and in the sides of the bottom mold part and the mold supporting structure are vertical slideways 277 for the slides 278 of the top mold part

274^b. In the slides 278 are slots 279 terminating at their upper end in annular sockets 280 and contained in the slots 279 are links 281 having annular heads 282, which oscillate in the annular sockets 280 as the links raise and lower the top mold part. The links 281 are pivoted to the lifter arms 283^a forming part of the bell cranks 283, the hubs 283^b of which are loosely mounted on the rock shaft 284. The rock shaft 284 is movable in a lengthwise direction through the hubs 283^b and is slidably mounted at one end in the mold supporting structure 275 and is journaled between its ends in a bearing 285 movable with the shift plate D. The end of the rock shaft 284 adjacent to the high speed shaft E is provided with a crank 286 having a roller 287 engaging with the rock shaft actuating cam 288, fixed on the high speed shaft. On the rock shaft 284 is a bell crank 291 provided with a key 284^a which permits the rock shaft to slide in a lengthwise direction through the bell crank hubs and which causes the bell cranks to turn with the rock shaft as the latter turns under the influence of the rock shaft actuating cam 288. The bell crank 291 is provided with a pin 292 extending into slots 293 of the lifter arm 283^a, the slots being elongated to permit of a limited movement of the pin 292 before coming into contact with the ends of the slots during the oscillation of the rock shaft. One part 275^a of the mold supporting structure is removably connected to the other part 275 and formed in the parts 275, 275^a, is a slideway 294 for the vertically movable bridge 295. The purpose of the vertically movable bridge 295 is to fill the gap caused by providing an opening adjacent to the bottom mold part 274^a for the end of the top mold part 274^b. When the mold is closed the bridge 295 is moved downward with the top mold part 274^b and remains down until the parts are returned, when the bridge 295 is lifted to close the gap by the lifter arms coming into contact with its lower end, variations in the travel of the bridge being compensated for by the flat springs 297 moving with the lifter arms 283^a and upon which the vertically movable bridge 295 normally rests. The top surface 295^a of the bridge is of the same shape as the top surface of the bottom mold part 274^a and moves into the same plane as the latter when the top mold part is lifted away from the bottom mold part to bridge the top of the slideway 294 for the ejection of the type bodies from the mold when the mold parts are separated. Fulcrumed to the mold structure 275^a is a clamp 298 having one arm 298^a adapted to bear against the mold side 274^c, when the mold parts are "locked up", and the other arm 298^b forked to receive the adjacent end of the link 30. In the link 301 is a slot 300 and extending through the forked sides of the

arm 298^b and through the slot 300 is a pin 299 pivotally connecting the link to the arm 298^b. The link 301 is pivoted to and turns with the bell crank 291 during the oscillation of the rock shaft 284 to force the clamping arm 298^b against the mold side 274^c and lock the mold side against the bottom mold part 274^a for the casting of the type body, and to release the clamping arm 298^b from the mold side 274^c when the casting of the type body has been performed so that the mold parts can be separated and the type body ejected from the mold. The arm 302 of each bell crank 283 is provided with a pin 303 engaging with the spring tensioned lever 305 fulcrumed to lugs 106 on the bed B, the tension springs 307 being connected to the lever arms 306 and to the bed.

When the rock shaft 284 turns in the direction indicated by arrow in Fig. 53, the pin 292 moves into engagement with the adjacent ends of the slots 293 and turns the lifter arms 283^a, with the bell crank 291, raising the links 281, until the top mold part 274^b is separated from the bottom mold part 274^a, and the bridge 295 until the top surface 295^a is in the same plane as the top surface of the bottom mold part 274^a. As the rock shaft 284 turns in the opposite direction to that indicated by arrow in Fig. 53, the lever 305 under the influence of the springs 307 engages with the pins 303 and turns the arms 302 to restore the arms 283^a to their normal position, returning at the same time the links 281 and closing the top mold part 274^b against the bottom mold part 274^a. Coiled on the rock shaft 284 is a spring 310 engaging at one end with the collar 309 and at the other end with the washer 308, the purpose of the spring being to prevent the hubs 283^b wandering on the rock shaft 284 as the latter moves lengthwise during the movement of the shift plate.

In the mold supporting structure 275 are fixed rollers 311, engaging with a serrated surface on the slide plate 278, causing the latter to be moved away from the rollers 311 in its upward or downward movement, thus preventing the mold side 274^c coming in contact with or wearing on the lower section of the mold 274^a, sufficient play in the slideways 277 being provided to allow of this movement.

Slidable on the top of the bottom mold part 274^a is the ejector 313, having in its bottom surface a dovetail groove 314 to receive the dovetail core 276 of the bottom mold part 274^a. The ejector 313 operates between the bottom mold part 274^a and the top mold part 274^b and the thickness of the ejector determines the depth of the mold cavity by spacing the top mold part from the bottom mold part. The end of the ejector adjacent to the mold side 274^c constitutes the moving and adjustable mold side or liner

274^a for the mold cavity and formed on the mold face of the adjustable mold side 274^a is a vertically inclined protuberance 315^a, which forms an inclined groove in the side of the type body to receive the inclined side of the space bar 399 hereinafter described, the inclination of the side of the groove corresponding with that of the space bar. The ejector is connected by a link 317 with the ejector lever 318 and projecting laterally from the ejector are two shoulders 319 engaging with the forks of the ejector adjusting lever 321 fulcrumed to the mold supporting structure 275 and having at its lower end a pin 324 which pivotally and adjustably connects the shoe 325 to the end of the adjusting lever 321.

Extending through the lever 321 is a set screw 326 bearing against the inner surface of the adjustable shoe 325 and adjusting it relatively to the end of the lever 321. In the mold supporting structure 275, opposite the adjustable shoe 325 is a slideway 327 and movable in the slideway 327 is the mold setting wedge 328 engaging with the adjacent face of the adjustable shoe provided with holes to tighten it. The wedge 328 actuates the lever 321 to adjust the mold side 274^a relative to the mold side 274^c, thus determining the width of the mold cavity in which the type body is to be cast. The mold setting wedge 328 is actuated by an arm 329 connected to the wedge setting rock shaft 330, the latter being provided with a wedge setting plate 331, having stepped recesses 332 opposed to the fingers 333 with which the push bars 334 are provided to operate the wedge setting plate when the push bars are positioned for that purpose. These push bars are pivotally suspended from the drop bars 138 and when a drop bar is released the finger 333 of its respective push bar is positioned where it will engage with the wedge setting plate 331. The push bars are provided with fingers 335 on the opposite sides to the fingers 333 and these fingers 335 are aligned with the plungers 336, when the push bars have been lowered by the descent of the drop bars. The plungers 336 are slidable in, and extend beyond the front end of, the plunger comb 336^a, to be engaged by the bell crank levers 337 fulcrumed to a bearing 338, carried by the shift plate D, and actuated by the cam 160.

Connected to the bottom of the push bars 334 and to the shift plate D are springs 339 which restore the push bars to a vertical position when they are relieved of the pressure of the plungers 336, the springs 339 also assisting the springs 148 in accelerating the descent of the drop bars 138. When a drop bar 138 is released, it descends, under the influence of the springs 148 and 339, and carries with it its respective push bar 334, so that when the downward motion of the drop

bar and push bar is arrested the finger 333 will be positioned opposite the wedge setting plate 331 and the finger 335 will be positioned opposite its respective plunger 336 and the fingers 333 of the unoperated push bars will remain opposite the stepped recesses 332. When the high speed shaft E revolves the cam 160 engages and actuates the bell crank levers 337 causing them to press the plungers 336 toward the push bars 334. The plunger 336, corresponding to the released drop bar, engages the finger 335 of its respective push bar and presses the latter toward the wedge setting plate 331 causing the finger 333 to engage with the wedge setting plate and oscillate the rock shaft 330 to set the wedge 328. The setting of the wedge 328 moves the lower end of the ejector adjusting lever 321 outward and the forked upper end inward to engage the shoulders 319 and move the mold side 274^a toward the mold side 274^c and hold the ejector in that position until the casting of the type body has been performed. The cam 160 then releases the bell crank levers 337 and plungers 336 which return to their normal position under the influence of the springs 340. When the drop bar 138 is returned to its normal position, by the drop bar lifting mechanism previously described, it lifts its push bar with it, and the spring 339 then causes the push bar to assume a vertical position. As the rock shaft 330 is mounted in bearings 343 connected with the bed, and remains in a stationary position during the movements of the shift plate, it is necessary to provide the stepped recesses opposite the fingers 333 in order that the fingers of those drop bars remaining in their normal position will not engage with the wedge setting plate as they move toward the latter. The drop bar representing the type body of the greatest thickness need not be provided with a push bar 334 as it is not necessary for that drop bar to operate the wedge setting plate 331 and wedge 328 as the wedge is normally positioned where it will adjust the lever 321 and ejector 313 to form a mold cavity of the greatest width. Coiled on the rock shaft 330 is a torsion spring 344 secured at one end to the rock shaft 330 and engaging at the other end with the bearing 343 for retaining the wedge setting plate in an upright position. Connected to the rock shaft 166 is an arm 166^a engaging with the arm 329 and returning the wedge setting plate 331 and wedge 328 to their normal position when relieved of the pressure of the finger 333, the action of the rock shaft 166 being subsequent to the return of the push bar 334 to its vertical position.

When the selected matrix character to be reproduced is presented to the mold cavity by the operation of the corresponding finger

key, in the key-board, projecting into the stop field a vertical stop to arrest the vertical flight of the matrix plate through the matrix plate carriage and a horizontal stop to arrest the horizontal flight of the matrix plate carriage in a horizontal direction, the corresponding drop bar 138 is released and carries downward with it the push bar 334. The finger 333 of the push bar is then opposed to the wedge setting plate and the finger 335 is opposed to the plunger 336. The positions of the fingers 333 may vary vertically on the different push bars 334 and it is the difference in the vertical positions of these fingers 333 that gives different degrees of movement to the wedge setting plate 331 and wedge 328 thus determining the width of the mold cavity. When the high speed shaft is set in motion the cam 160 engages with the bell crank levers 337 and actuates them to press the plungers 336 toward the push bars 334. The plungers of all the push bars except the one which has been lowered move under the influence of the bell crank levers and cam without coming into engagement with the fingers 335, but the plunger of the drop bar which has been lowered comes into contact with the finger 335 and moves the push bar in the direction of the wedge setting plate rocking the latter and the rock shaft 330 to set the wedge and determine the width of the mold cavity.

Before the mold parts are "locked up" the top mold part 274^b is yieldingly held in contact with the ejector 313 by the tension of the springs 307 applied to the slides 278 through the lever 305, pin 303, bell crank 283 and links 281 until the oscillation of the rock shaft 284 actuates the clamp 298 through the link 301 to effect the "locking up" of the mold parts. When the type body is cast, the rock shaft 284 oscillating in the direction indicated by arrow in Fig. 53, releases the mold part and causes the links 281 to lift the top mold part 274^b and mold side 274^c away from the bottom mold part and at the same time raise the bridge 295 until its top surface is in the same plane as the top surface of the bottom mold part to bridge the cavity occupied by the mold side 274^c. The ejector 313 is then actuated to deliver the type body from the mold cavity to the type transfer carriage 235 and then return it to its normal position. The top mold part is then closed, against the ejector and bottom mold part, by the action of the links 281, bell crank 283, lever 305 and spring 307, the bridge 295 descending with the downward movement of the lifter arms 283^a so that the mold side 274^c can resume its position in the slideway 294 against the end of the bottom mold part. The lever 318 is mounted on the rock shaft 346 journaled in bearings 347 connected to the field shift standard 177 and provided with a crank 348 and roller 349

actuated by a cam 350 on the high speed shaft E. The lever 318 is provided with a roller 351 engaged by an oscillator 352 (see Figs. 7 and 35) pivoted at one end to the shift plate D and engaged at the other end by the rock shaft operating slide 171 by which it is actuated. The cam 350, when engaging the roller 349, operates the rock shaft 346 oscillating it and the lever 318 to move the ejector in the direction of the type transfer carriage so that the ejector will deliver the type body from the mold cavity to the type transfer carriage. The rock shaft operating slide 171, moving under the influence of the cam 173, moves the oscillator 352 into contact with the roller 351 when the delivery of the type body by the ejector to the type transfer carriage occurs. The oscillator 352 by its engagement with the roller 351 causes the lever 318 and rock shaft 346 to turn in the opposite direction to their oscillation under the influence of the cam 350 and this action of the oscillator moves the lever 318 into the position shown in full lines in Fig. 47 and returns the ejector to its normal position. Coiled on the rock shaft 346 is a torsion spring 353 connected at one end to the rock shaft and bearing at the other end against a field shift standard 177 the purpose of the torsion spring being to tension, through the lever 318, the ejector 313 against the forks of the adjusting lever 321. Carried by the mold side 274^c is a core pin 355 which rests in a groove 356 in the mold side 274^a, the purpose of the core pin being to produce the alining recess 357 across the back of the type body.

The nozzle plate 72, forming the foot of the type body mold, is pivoted at one end to the mold supporting structure so that its conical ingate 71 will be opposed to the mold cavity and alined with the nozzle 69 of the melting pot, the conical formation of the ingate 71 forming a knife edge on the mold side which is utilized to strip the gate from the type body as the latter is pushed by the ejector from the mold cavity to the type transfer carriage.

Melting pot and melting pot actuating mechanism, (see Figs. 1, 3, 4, 5, 8, 54, 55, 56, 57, 58, 59 and 60.)—I have provided in my machine two melting pots, one a large supply pot constantly running and forcing molten metal to the smaller or working pot, both pots being supplied with suitable burners for heating. Provision in the working pot is made for an overflow which shall return to the main supply pot and for operating connections to the high speed shaft. In the structure of the working melting pot is a type metal well 64 having a vertically operable spring pressed plunger 65 and adjacent to the type metal well 64 is the type metal reservoir 66 connected with the type metal well 64 by an inlet duct 67. At the top of the

type metal well is a horizontal neck 68 extending in the direction of the mold cavity 92 and slidable in the horizontal neck is a nozzle 69. The head 69^a of the nozzle is of a tapering or conical shape and enters a correspondingly shaped ingate 71 in the nozzle plate 72. The nozzle is movable within the horizontal neck and is provided with an adjusting collar 73 outside of which is the tie 77 of the yoke 78 pivotally connected to the arm 81 of the vertical rock shaft 82. The rock shaft is journaled in a bracket 83 projecting from the side of the melting pot structure and in a bearing 84 forming part of the melting pot base 85. Projecting from the rock shaft 82 is an arm 86 connected by an adjustable link 87 with the shift plate D which during its movements oscillates the rock shaft actuating the nozzle through the intermediate connections.

The plunger 65 operates in the type metal well 64 and its lower end is bifurcated to provide forks 95 between which is pivoted the hub 96 of a link 97 connecting the plunger with the bridge 98 of the elevator rods 99. Bolted to the pedestal A, below the melting pot, is a guide 101 having apertures 102 for the elevator rods which are provided, below the guide, with check nuts 103, limiting the upward movement of the elevator rods and preventing the plunger coming into contact with the horizontal neck 68 when the type metal in the type metal well is below its normal level. Springs 104 are provided for the elevator rods 99 and engage with the guide 101 and the shoulders 105^a, supporting the bridge 105, to lift the elevator rods and plunger until the movement of the latter is arrested.

The bed B is provided with bearings 107 for the plunger rock shaft 108 and projecting from the rock shaft 108 is an arm 109 to which is pivoted one end of a link 110, the opposite end of the link being pivoted to the lever 111 fulcrumed on a rod 112 mounted in bearings 112^a connected with the shift plate D. The end of the lever opposite that pivotally connected to the link is provided with a roller 113 engaged by a cam 114 on the high speed shaft E. Fixed on the rock shaft 108 is an arm 117 having a roller 118 engaging the bridge 105 during the oscillation of the rock shaft in the direction indicated by arrow in Fig. 60. In the guide 101 intermediate the elevator rods 99 is a slot 119 for the detent pawl 120 which has a lip 121 to engage the bridge 105 when the elevator rods are in their lowered position. The detent pawl 120 is pivoted on a rod 122 extending through the guide 101 and is provided at its upper end with a releasing stud 123 engaging a retaining arm 124 extending from the rock shaft 108. Fixed on the rock shaft 108 is a forked arm 125 in which is pivoted a releasing pawl 126 to disen-

gage the releasing stud from the retaining arm during the oscillation of the rock shaft.

During the revolution of the high speed shaft, the part 114^a of the cam 114 engages with the roller 113, depressing the adjacent end of the lever 111, raising the link 110, oscillating the rock shaft 108 in the direction indicated by arrow in Fig. 60, lowering the retaining arm 124 and bringing the end of the releasing pawl 126 into engagement with the releasing stud 123 so that the releasing pawl 126 will press the releasing stud and detent pawl outward and disengage the releasing stud from the retaining arm and the lip 121 of the detent pawl from the bridge 105. When the lip 121 is disengaged from the bridge 105 the springs 104 lift the elevator rods and plunger into their active position for the ejection of the type metal into the mold cavity 92, this action of these parts occurring while the projection 114^a is engaging with the roller 113. When the roller is engaging with the part of the cam between the part marked 114^a and that marked 114^b a slight recession of the oscillation of the rock shaft 108 occurs lifting the roller 118 out of the path of the yoke 105 and insuring a lapse of sufficient time to effect the casting of the type body. When the roller is moving on the cam between the place marked 114^b and that marked 114^c the oscillation of the rock shaft 108 in the direction indicated by arrow is continued bringing the roller 118 again into contact with the bridge 105 and depressing the elevator rods and plunger creating a suction in the type metal well to withdraw the type metal from the horizontal neck and the nozzle. When the plunger and elevator rods are in their lowered position the detent pawl 120 is drawn by the spring 128, fastened to the detent pawl 120 and to a hook 127, into position where its lip 121 will engage with the bridge 105, this action of the detent pawl 120 occurring when the cam part marked 114^c engages with the roller 113. When the cam is moving from the place marked 114^c to that marked 114^d the rock shaft 108 is in a state of inertia to allow sufficient time for the detent pawl 120 to move into position to engage with the yoke.

When the cam is moving from 114^d to 114^e the rock shaft 108 is slowly oscillating in a reverse direction to that indicated by arrow, gently permitting the yoke 105 to rise into engagement with the lip 121, the oscillation of the rock shaft 108 being continued until the roller 118 attains its normal position above the yoke. The action of the cam 114 is neutral when the roller 113 is traveling from 114^e to 114^f. When traveling from 114^f to 114^g the roller 113 drops into the recess between these parts and causes a slight oscillation of the rock shaft 108 in the opposite direction to that indicated by arrow

to insure the engaging end of the releasing pawl being positioned to engage with the releasing stud for the next operation of the machine. The roller 113 is continuously maintained in engagement with the cam 114 by a spring 130, contained in a recess in the shift plate D, bearing against the lever 111.

Projecting from the pedestal A is an arm 131 supporting a cluster of burners 129 to heat the reservoir, the type metal well and the nozzle, the heated gases from which escape from the structure of the type metal pot through the usual vents 100.

Horizontal stopping plate returning mechanism, (see Figs. 4, 8, 24, 25, 26, 33, 34 and 35.)—Connected to one end of the vertical stopping plate comb 30 is a guide plate 163^a covering one end of the vertical stopping plates 31 and separated from the latter by a space occupied by the stopping plate return slide 163. The stopping plate return slide 163 is provided with two arms 164 extending beyond the adjacent end of the vertical stopping plates, and vertically slotted to receive the guide rod 165 connected to and oscillating with the rock shaft 166, the arms 164 moving vertically on the guide rod 165 according to the movement of the stopping plate comb 30. A crank 168 is fixed on the rock shaft 166 and is provided with a crank pin and roller 169 operating in a groove 170 in the rock shaft operating slide 171, the rock shaft operating slide being provided with an arm 172 having a roller 172^a engaging with and actuated by a cam 173 on the high speed shaft E. During the revolution of the high speed shaft the cam 173 forces the rock shaft operating slide 171 in the direction indicated by arrow in Fig. 35, oscillating the rock shaft 166 and the guide rod 165 and moving the stopping plate return slide 163 partly across the face of the vertical stopping plate comb 30 to engage with any movable vertical stopping plate 31 which has been previously projected into the path of the matrix plate and return that stopping plate to its position within the vertical stopping plate comb. The cam 173 exerts its force upon the roller 172^a until the stopping plate return slide 163 has completed the performance of its function and then relieves the roller 172^a of its force so that the cam 174 can engage a projection 175 extending from the rock shaft operating slide 171 and restore the rock shaft 166 to its normal position. The spring 176 which is shown as bearing against the arm 172 and against the standard 177 is to tension the rock shaft 166 through the agency of the rock shaft operating slide 171.

Type transfer, (see Figs. 1, 3, 4, 5, 6, 7, 9, 47, 48, 61, 62, 63, 64 and 65.)—The type transfer carriage 345 is oscillatingly connected to the type transfer carriage arms 358 and its top surface has a dove tail core 359

corresponding to the dove tail core formed on the bottom mold part 274^a so that the type, delivered by the ejector on the type transfer carriage, can be held in the same position on the latter as it occupied in the mold. The arms 358 are oscillatingly mounted on a shaft 360 and the hub of one of the arms is provided with a toothed segment 361 which meshes with the toothed segment 362 of the crank arm 363 fixed on the shaft 364. The shaft 364 is journaled in bearings 365, 374, mounted on the bed B, and the end of the shaft 364 adjacent to the high speed shaft E is provided with a crank arm 366 carrying a roller 367 engaging with the cam 368 on the high speed shaft. The bottom of the type transfer carriage 345 is provided with a shoulder 369 engaging with a seat 370 in the adjacent end of the spacer box 400. Pivoted to the shoulder 369 is one end of a differential arm 372, the other end of the differential arm being mounted upon a stud 373 supported by the bearing 374. The shaft 360 is mounted in the same bearing 374 as the stud 373 and the centers of the shaft 360 and the stud 373 are in the same horizontal plane so that during the oscillation of the arms 358 carrying the type transfer carriage 345, the differential arm 372 will operate to maintain the top surface of the type transfer carriage, in a horizontal plane as it travels from the spacer box 400 to the mold and returns again to the spacer box. During the revolution of the high speed shaft E the cam 368 engages with the roller 367 and through the agency of the crank arm 366 rocks the shaft 364. During the initial oscillation of the shaft 364 the toothed segment 362 meshes with the toothed segment 361 and oscillates the arms 358 to move the type transfer carriage 345 from the spacer box 400 to the mold structure 275, and during the reverse oscillation of the shaft 364 causes the arms 358 to return the type transfer carriage 345 to the spacer box 400. The type bodies are delivered from the type transfer carriage to the line assembling box by the secondary type transfer consisting of a shuttle 375 pivoted at one end on a stud 376 mounted in the lugs 377 depending from the slide 378 and having at its other end a radial slot 379 for the stud 380 held by the lugs 381 depending from the slide 378. Bearing against the slide 378 and against the shuttle 375 is a spring 382 pressing the shuttle in the direction of the top surface of the type transfer carriage. On the inner side of the shuttle 375 is a segmental projection 383 with which engages a roller 384 mounted on a stud projecting from the lifter 385. The lifter 385 is pivoted to the secondary type transfer bracket 386 and is pressed into an operative position by a spring 387, its operative position in a downward direction being determined by a stop 388 which

projects from the secondary transfer bracket 386 and engages the lower edge of the lifter 385.

Connected to the shuttle 375 is one end of a link 388^a, the other end of the link being pivotally connected to a crank arm 389 fixed on the rock shaft 390. The rock shaft 390, see Fig. 63, is journaled in bearings attached to the field shift standard 177^a and is actuated by a cam 391 on the high speed shaft E through the agency of the roller 392 and the bell crank 393 is fulcrumed on a stud 394 extending from the field shift standard 177^a and connected by a link 395 with a crank arm 396 fixed on the rock shaft 390. During the revolution of the high speed shaft the cam 391 engages with the roller 392 and operates the bell crank 393, link 395 and crank arm 396 to oscillate the rock shaft 390. The initial oscillation of the rock shaft 390 moves the crank arm 389 in the direction indicated by arrow in Fig. 62, carrying the shuttle into position where its type push bar 397 will engage the type body on the type transfer carriage. During this motion of the shuttle the segmental projection 383 is traveling above the roller of the lifter 385 and the shuttle is raised into a plane where the type push bar 397 will pass above the type body as the type push bar moves to assume a position behind the latter. As the type transfer carriage comes into contact with the spacer box the shuttle completes its travel in the direction indicated by arrow and the segmental projection 383 passes the roller 384, the shuttle then descending until its downward motion is arrested by the stud 380 engaging at the top of the radial slot 379. The type push bar 397 is then behind the type body and in the same plane as the latter and ready to engage the type body when the reverse oscillation of the rock shaft commences. During the reverse oscillation of the rock shaft the crank arm 389 through the agency of the link 388^a moves the shuttle and the slide 378 until the type push bar has traveled along the top of the type transfer carriage and the spacer box and has pushed the type body into the assembling line, the return of the type body from the assembling line to the spacer box being prevented by the spring pressed pawls 398 pivoted at one end to the sides of the spacer box so as to project at the other end slightly above the top surface of the latter. During the movement of the shuttle to deliver the type from the type transfer carriage to the assembling line, the segmental projection 383 moves beneath and lifts the roller 384 and the lifter 385 until the shuttle completes its movement in the other direction, the roller then dropping into a position where it will be below the segmental projection 383 on the next action of the shuttle when moving in the direction indicated by

arrow in Fig. 62. When the type push bar 397 is delivering the type body into the assembling line, the shuttle moves across the opening of the spacer box and then recedes a sufficient distance to permit of a spacer 399 being inserted into the assembling line.

Space bars and spacer bar, (see Figs. 4, 6, 7, 41, 48, 61, 62, 63, 66, 67, 68 and 69.)—The space bars 399 are contained in a spacer box 400 adjoining the line assembling box 401 and are inserted into the line of assembling type bodies by the operation of the spacer key 2. When the spacer key 2 is pressed, its key rod 402 rocks the spacer lever 403 to lift the spacer elevator 404 and project the foremost space bar 399 into the path of the type bodies delivered by the type transfer mechanism into the assembling line. The spacer box 400 is provided with a removable cover 405 having an opening 406 adjacent to the line assembling box 401 for the insertion of the space bars into the assembling line of type bodies. In the sides of the spacer box 400 are horizontal grooves 407 in which are contained the follower slides 408 and connected to the follower slides 408 is a follower 409, pressed against the space bars 399 by a torsion spring 410. Connected to the inner faces of the spacer box sides are spring detent pawls 412 which engage with the space bar aligned with the cover opening 406 and prevent it moving out into the line assembling box until it has been inserted into the line of assembling type bodies. The space bars 399 are formed between their ends with grooves 413 which come into line with the detent pawls 412 so that the space bars when lifted into the assembling line can pass the pawls as they move into the line assembling box. At the top of the inner faces of the line assembling box sides are horizontal grooves 414 extending lengthwise of the line assembling box and contained in the grooves 414 are cylindrical detent bars 415, 415^a which engage with the edges of the space bars. The grooves 414 are of substantially cylindrical shape each having an opening less than the diameter of the detent bars so that a small segment of each detent bar will project through each opening into the line assembling box. The detent bars are free to turn in the grooves 414 and are pressed by springs 416 to project slightly through the openings of the grooves and yieldingly engage with the space bars in the assembling line, this yielding action of the detent bars permitting of the introduction of other space bars into the assembling line from the spacer box without releasing those space bars which have already been inserted between the type bodies. By allowing the detent bars 415, 415^a to revolve in the grooves 414 the wear caused by the action of the space bars will be distributed to the whole

of the peripheral surface of the detent bars instead of being confined to the segments projecting into the line assembling box. The detent bar 415^a terminates at the junction of the line assembling box with the spacer box and the other detent bar 415 extends into the spacer box a distance equal to the width of one space bar. This construction permits of a space bar being inserted in the assembling line without disturbing the detent bar 415^a.

The space bar 399 is of a substantially prismatic shape having one face 399^a vertical, and the opposite face 399^b inclined to converge with the face 399^a at the top of the space bar, the inclination of the face 399^b corresponding to the inclination of the inclined groove X in the type body Y. The object of this construction is to enable the space bars to move vertically between, and engage the full depth of the side faces of the type bodies without displacing the horizontal plane of the type bodies in the assembling line. At the top of each side of the space bars are two segmental grooves 399^d by which the space bars are suspended from the detent bars 415, 415^a. In the foot of each space bar is a justifier recess 489, the upper end of the justifier recess 489 being curved to provide for the movement of the justifier head 487 and extending horizontally from one side of the justifier recess is a lug 490 engaged by the tooth forming part of the justifier head, when the justifier is withdrawing the space bar from the assembled line.

Line assembling box, line carriage and justifying mechanism, (see Figs. 1, 2, 3, 4, 6, 7, 9, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81 and 82.)—The type bodies assemble on the top of the line assembling box sides 401^a and the space bars 399 are carried in their proper position in the assembling line by the detent bars 415, 415^a, as the line advances, the assembling of the type bodies continuing until the line is approximately filled. Between the sides of the line assembling box 401 is the auxiliary line carriage 418 having an arm 418^a to which is hinged one end of a jointed link 419, the opposite end of the link 419 being hinged to the crank arm 420 extended from the rock shaft 421. Extending from the rock shaft 421 at substantially right angles to the crank arm 420 is a pin 422 having at its outer end a stop 423, see Fig. 73, and slidable on the pin 422 is a collar 424 arrested at the outer end of the pin 422 by the stop 423 and at the inner end of the pin by the bossing 425 by which the pin is connected to the rock shaft. Connected to the collar 424 is one end of a spring 426, the opposite end of the spring 426 being attached to a stud 427 projecting from one of the sides of the line assembling box 401, the spring holding the auxiliary

line carriage to resist the derangement of the type bodies during assemblage and returning the auxiliary line carriage 418 toward the spacer box when the line has been carried away by the line carriage 417. In the lower end of the auxiliary line carriage 418 is a vertical slot 428 to receive the justifier head 487 when the latter is actuated to justify the assembling line and withdraw the spacers from it. On the sides of the auxiliary line carriage 418 are rollers 430 moving in the grooves 431 formed in the inner faces of the line assembling box sides 401^a, the rollers 430 supporting the auxiliary line carriage 418 as it moves in the grooves in one direction under the influence of the assembling type bodies and in the other direction under the impulse of the spring 426. The top of the auxiliary line carriage 418 is provided with a catch 432 and in the face of the auxiliary line carriage adjacent to the spacers and assembling type bodies is a vertical groove 434 to receive the vertical tongue 435 of the line finger 436. The line finger 436 is provided on one side with a lug 437 moving in the horizontal grooves 438, 438^a during the movement of the auxiliary line carriage 418, and in both sides of the auxiliary line carriage 418 and line finger 436 are recesses 439 to receive the detent pawls 412 when the auxiliary line carriage is positioned against the spacer box. The auxiliary line carriage advances until arrested by the stop 440 between the sides of the line carriage 417 when the detent pawl 433 forming part of the line carriage engages with the catch 432. During the movement of the auxiliary line carriage in the direction of the stop 440 the lug 437 travels in the groove 438 and when the auxiliary line carriage engages the stop 440 the lug 437 is in position to be engaged by the inclined surface 441. The line carriage 417 when removing the composed and justified line from the line assembling box draws the auxiliary line carriage 418 and line finger with it owing to the engagement of the pawl 433 with the catch 432. When the auxiliary line carriage 418 is moving with the line carriage 417, the inclined surface 441 engages the lug 437 and lowers the line finger on the face of the auxiliary line carriage until the top edge of the line finger is below the plane of the bottom of the type bodies. The movement of the auxiliary line carriage and line finger with the line carriage is continued until the detent pawl 433 comes into engagement with a trip 442 in the line assembling box and is released from engagement with the catch 432.

When the detent pawl 433 releases the catch 432, the auxiliary line carriage and line finger are impelled toward the spacer box by the action of the spring tensioned lever 420 and link 419. When the auxil-

iary line carriage and line finger are moving
 toward the spacer box, the lug 437 travels
 along the groove 438^a until it comes into con-
 tact with the inclined surface 443 which lifts
 5 the line finger and restores it to its normal
 position. When the line finger is restored
 to its normal position on the face of the aux-
 iliary line carriage it is temporarily locked
 in that position by the pin 444 extending
 10 from the line finger through a slot 446 in
 the auxiliary line carriage and engaging
 with the spring detent 445. The line assem-
 bling box 401 is supported by the line as-
 sembling box structure 447 having a run-
 15 way 448 for the line carriage 417. The line
 carriage 417 consists of two sides 417^a each
 of which is formed with a slot 449 extending
 lengthwise of the line carriage. The plane
 20 of the lower edge of the slots 449 when the
 line carriage is positioned on the line assem-
 bling box 401, is slightly below the plane
 of the top edge of the sides 401^a of the line
 assembling box and the plane of the top
 25 edge of the slot 449 is sufficiently above the
 top edge of the sides 401^a to be clear of the
 type bodies of the assembling line when the
 line carriage is being moved into position
 to receive the assembled line. Those parts
 30 of the line carriage sides between the slots
 449 and the top of the line carriage con-
 stitute the fixed jaws 450 and on the inner
 faces of the line carriage sides 417^a are the
 movable jaws 451, in parallel relation with
 the fixed jaws, and in the movable jaws are
 35 recesses 452 to receive the arms 453^a, of the
 bell crank 453 fulcrumed to the line car-
 riage sides 417^a by the studs 454. The arms
 453^b are contained in the recesses 455 of
 the slides 456 movable in slideways 457 in
 40 the inner faces of the line carriage sides 417^a
 to provide the movable jaws with a parallel
 movement. Passing through the line car-
 riage 417 below the pawl 433 is a rock shaft
 458 and fixed on the rock shaft 458 on the
 45 outer face of the line carriage sides 417^a are
 cranks 459. Projecting from the cranks 459
 are crank pins 460 extending through curved
 slots 461 in the line carriage sides and actu-
 ating the slides 456. The rock shaft 458 is
 50 turned in one direction by torsion springs
 463 to close the movable jaws and is turned
 in the opposite direction to open the mova-
 ble jaws by power, manual or otherwise,
 applied to the pin 464 projecting from one
 55 of the cranks 459. When the crank shaft
 has been turned to open the movable jaws
 one of the cranks 459 is engaged and held
 by a spring pressed detent pawl
 60 465 until the latter is tripped by the ac-
 tion of the justification lever 466. The
 justification lever 466 is fixed on a rock
 shaft 467 mounted in bearings 468 sus-
 pended from the bed B and is provided
 65 with a crank arm 469 pivoted to one end
 of a link 472, the other end of the link being

pivoted to one end of the lever 473 ful-
 crumed on a stud 474 supported by the ped-
 estal. The other end of the lever 473 is
 pivoted to a link 475^a which in turn is con-
 70 nected to a barrel 475 which receives the rod
 connection 476 of the justifier yoke 477. In
 the barrel 475 is an elongated slot 478 and
 projecting from the rod connection 476 is
 a pin 479 extending through the slot 478
 75 to be arrested when it comes into contact
 with the upper end of the slot. Interposed
 between the rod connection 476 and the bot-
 tom of the barrel 475 is a spring 480. The
 upper end of the justifier yoke is provided
 with hinge members 484 and connected to
 80 the hinge members 484 by a hinge pin 485
 are the hinge members 486 of the justifier
 head 487. Coiled on the hinge pin 485 are
 torsion springs 488 which maintain the jus-
 tifier head in a position where it will enter
 85 the justifier recess 489 in the foot of the
 space bar 399 and engage with the lug 490
 in that recess, the justifier head 487 being
 provided with a tooth 491 for that purpose.
 When the justification lever 466 is operated
 90 it turns the rock shaft 467 and through the
 agency of the crank arm 469, link 472, lever
 473, and justifier yoke 477 and the connec-
 tions between the justifier yoke and the lever
 473 presses the justifier head 487 into the
 95 justifier recess 489 in the foot of those space
 bars inserted in the assembling line and ad-
 vances those spacers between the type bod-
 ies to justify the line. While the space bars
 are in their raised position between the type
 100 bodies the spring pressed detent pawl 465 is
 tripped by a pawl 492, actuated by a verti-
 cal rod 493 engaged by a projection 494
 from the lever 473, see Fig. 7. The release
 of the detent pawl 465 allows the rock shaft
 105 458 and cranks 459 to operate and move the
 slides 456 so that they will close the mov-
 able jaws 451 against the type bodies and
 the latter against the fixed jaws 450 to hold
 the composed line in its word spaced and
 110 justified condition. During the reverse ac-
 tion of the justification lever 466 the jus-
 tifier head and its connections move down-
 ward and withdraw the space bars from the
 justified and locked line into the line assem-
 115 bling box so that they can be returned to
 the spacer box by the action of the auxiliary
 line carriage 418. The justification lever
 466 is held in its normal position by a tor-
 sion spring 466^a coiled upon the rock shaft
 467 and engaging at one end with the bed B
 120 and at the other end with the rock shaft.

Type aliner. (see Figs. 1, 2, 3, 4, 6, 7, 9,
 67, 70, 71, 72, 73, 74, 75, 76, 77 and 78.)—
 125 Hinged to the type assembling box is the
 type aliner box 495 the internal dimensions
 of which are sufficient to permit of the up-
 ward movement of the space bars 399 under
 the influence of the justifying mechanism.
 In the lower edges of the sides 495^a are

grooves 496, 496^a extending lengthwise of the sides 495^a and contained in the grooves 496, 496^a are the type aliners 497, 497^a.

Pressing against the back of the type aliners 497, 497^a are spring pressed plungers 498 which project the type aliners below the bottom of the sides 495^a and in the ends of the type aliners are slots 490 into which enter the bent ends of the retaining plates 500, the slots being of a sufficient depth to permit of the type aliners being pressed into the grooves 496, 496^a to compensate for the difference in the height of the type bodies, the type aliner 497 entering the aliner recesses 357 in, and the edge of the type aliner 497^a being sharpened to grip, the type bodies. The type aliner box 495 extends partly across the spacer box 400 and the type aliners 497, 497^a are separated from the top surface of the spacer box sufficiently to permit of the delivery of the type bodies from the type transfer carriage to the line assembling box. When the type bodies are delivered from the type carriage to the line assembling box they pass beneath the ends of the type aliners 497, 497^a, which prevent their vertical and lateral displacement as they move into the assembling line. In the end of the type aliner box 495 overhanging the spacer box is a recess 501 to receive the adjacent end of the shuttle 375 and projecting from the top of the type aliner box 495 is a guide 502 which enters a groove 503 in the adjacent end of the slide 378 during the forward movement of the slide and shuttle and keeps the shuttle in contact with the spacer box. The type aliner box 495 is locked in its closed position by an arm 506 connected to the line assembling box structure 447 and provided with a catch 507 which is engaged by the tooth 508 of the spring pressed latch 509 fulcrumed to the adjacent side 495^a. Connected to the type aliner box 495 is a stop 510 which engages with the top of the arm 506 and maintains a parallel alinement of the bottom edges of the sides 495^a with the top edges of the line assembling box.

Having thus fully described my invention what I claim as new and desire to secure by Letters Patent is:—

1. In a type casting and composing machine, a key-board, a type body mold, a two-way moving matrix plate, and stops, adjusted by the key-board when it is operated, to arrest the movement of the matrix plate in two directions for the presentation of a selected character to the type body mold.

2. In a machine for casting type bodies with desired and indicated characters, a suspended matrix plate having two or more independently usable fields of matrix characters to be brought to a casting position by a two-way movement of the matrix plate, means for changing the fields, and stopping means for arresting the matrix plate in two

directions, the stopping means arresting the movement in one direction movable with the field changing means.

3. In a machine for casting type bodies with desired and indicated characters, a matrix plate having two or more independently usable fields of matrix characters capable of being brought to a casting position by a two-way movement of the matrix plate, and key-beard actuated stopping means for arresting the movement of the matrix plate in two directions, the stopping means arresting the movement in one direction movable with the matrix plate when changing the fields.

4. In a machine for casting type bodies with desired and indicated characters, a type body mold, a matrix plate having two or more independently usable fields of matrix characters movable in parallel relation to the type body mold, and two sets of key-board actuated stops arresting the movement of the matrix plate in two directions to select a character from a field for presentation to the type body mold, one set of stops movable with the matrix plate when changing the fields.

5. In a machine for the production of type bodies in any desired order, a matrix plate provided with two or more independently usable fields of characters, key-board actuated stops to select any desired character from any operative field for presentation to a type body mold, and means for bringing each field of characters represented on the matrix plate into operative relation with the key-board.

6. In a machine for the production of type bodies in any desired order, a matrix plate provided with multiple fields of characters, a key board causing the presentation of the matrix plate to a type body mold and having a key for each character of the matrix field and means for bringing any selected field of the matrix plate into operative relation with the key board.

7. In a machine for the production of type bodies in any desired order, a key-board, a matrix plate provided with multiple fields of characters, and means for bringing any selected field into operative relation with the key-board.

8. In a machine for the production of type bodies in any desired order, a key-board, a type body mold, a matrix plate provided with multiple fields of characters, and means for bringing any selected field into operative relation with the key-board for the presentation of a selected character in the operative field to the type body mold.

9. In a machine for the production of type bodies in any desired order, a key-board, a type body mold, a matrix plate provided with multiple fields of characters, field changing means, the actuation of which will

bring any field into operative relation with the key-board, and stops controlled by the operation of the key-board for the presentation of a selected character in the operative

5 field to the type body mold.

10. In a machine for the production of type bodies bearing desired and indicated characters, a key-board, a matrix plate provided with fields of characters in multiples
10 of those represented on the key-board, a field changing means which will present a selected field to cooperate with a type body mold, and a set of key-board actuated stops
15 arrest the movement of the matrix plate in one direction.

11. In a machine for the production of type bodies bearing desired and indicated characters, a key-board, a matrix plate provided with fields of characters in multiples
20 of those represented on the key-board, a field changing means which will present a selected field to cooperate with a type body mold and two sets of key-board actuated
25 stops controlling the movement of the matrix plate in two directions, one set of said stops being connected to move with the field changing means, and the other having a fixed relation with the matrix plate.

30 12. In a machine for the production of type bodies, a key-board, a matrix plate having two or more fields of characters in multiples of those represented on the key-board, means for retaining the matrix plate
35 in a normal position operative with the key-board, key-board actuated stops to select any desired character for presentation to a type body mold together with means for shifting the normal position of the matrix plate to
40 bring any selected field into operative relations with the key-board and maintain its primal relation with the key-board actuated stops.

45 13. In a machine for casting type bodies in any desired order, a type body mold, a matrix plate containing two or more fields of matrix characters, the characters of each field being independently usable, a key-board and intermediate mechanism for
50 bringing any desired character of any operative field to the casting position of the type body mold.

14. In a machine for casting type bodies with desired and indicated characters from
55 a two-way moving matrix plate having two or more fields of independently usable characters, means by which any field may be brought into operative relation with a type body mold, two sets of stops arresting the
60 movement of the matrix plate in two directions, one set of stops being movable with the means changing the fields of the matrix plate and a key-board mechanism actuating the stops to arrest the movement of the
65 matrix plate in two directions.

15. In a machine for casting type bodies with desired and indicated characters from a matrix plate having two or more fields of independently usable characters, field shifting means by which any field may be brought
70 into operative relation with a type body mold, stops arresting the movement of the matrix plate in one direction unitedly movable with the field shifting means and a key-board actuated selector having a selecting
75 finger to project a stop for the presentation of the same relatively located character in each field.

16. In a machine for the production of type bodies in any desired order, a key-board having finger keys with character representation, a matrix plate provided with fields of characters in multiples of those represented
80 on the key-board, stops arresting the matrix plate in two directions to select a character for presentation to a type body mold, means for bringing any one field into operative relation with the key-board, and a one-way moving stop selector actuated by
85 the key-board to position a stop to arrest the matrix plate in one direction.

17. In a machine for the production of type bodies in any desired order, a key-board having finger keys with character representation, a matrix plate provided with fields
90 of characters in multiples of those represented on the key-board, means for bringing any one field into operative relation with the key-board, a one-way set of stops movable with the matrix plate when the operative position
95 of the fields is changed and a one-way moving stop selector actuated by the key-board to position a stop therefrom for a one-way movement of the matrix plate.

18. In a machine for casting type bodies with desired and indicated characters, a key-board, an adjustable field shift, a matrix plate having two or more fields of independently
100 usable characters adjustable with the field shift to bring any selected field into operative relation with the key-board and means connecting the matrix plate with the field shift by which it has motion independent of the latter for the presentation of any selected
105 character in the operative field to a type body mold.

19. In a machine for casting type bodies with desired and indicated characters, a vertically adjustable field shift, a matrix plate having two or more fields of independently
110 usable characters pendently supported from and vertically adjustable with the field shift and means for vertically moving the matrix plate independently of the field shift.

20. In a machine for casting type bodies with desired and indicated characters, an adjustable field shift, and a matrix plate having two or more fields of independently
115 usable characters pendently supported from and adjustable with the field shift to bring
120
125
130

any field into operative relation with a type body mold and having motion independent of the field shift to bring any selected character in that field to a casting position.

21. In a machine for casting type bodies, with desired and indicated characters from a matrix plate having two or more fields of independently usable characters, a field shift for pendently supporting a matrix plate, means adjusting the field shift to bring any field into operative relation with a type body mold, and two sets of stopping means controlling the movement of the matrix plate in two directions one of said sets being adjustable with the field shift to maintain a fixed relation with the matrix plate.

22. In a machine for casting type bodies with desired and indicated characters, a matrix plate having two or more independently usable fields of characters, a field shift supporting the matrix plate to bring any field into operative relation with a type body mold, two sets of stops arresting the movement of the matrix plate in two directions, one of said sets of stops being movable with the field shift to maintain a fixed relation with the matrix plate, and a key-board mechanism for actuating the stops.

23. In a type casting machine, a type body mold, a two-way moving matrix plate, two sets of stops arresting the movement of the matrix plate in two directions, one stop from each set being selected, by the key-board when it is operated, and adjusted to bring the selected character on the matrix plate to the casting position.

24. In a type casting machine, a key-board, a type body mold, a matrix plate movable in two directions, stops to arrest the movement of the matrix plate, and a matrix plate moving mechanism, the key-board being operably connected with the stops whereby they can be adjusted at each operation of the key board.

25. In a machine for casting type bodies, a two-way moving matrix plate having on its face a field of matrix characters, two sets of stops arresting the movement of the matrix plate in two directions, and a key-board operably connected with the two sets of stops to adjust one stop from each set for positioning a selected character in the matrix field at the casting position at each operation of the key-board.

26. In a machine for casting type bodies, a key-board, a type body mold, a matrix plate having matrix characters arranged in rows in two directions for presentation to the type body mold by a two-way movement of the matrix plate, and stops operably connected to, and projected by, the key-board, into the path of the matrix plate at each operation of the key-board.

27. In a machine for casting type bodies,

a type body mold, a two-way moving matrix plate, two sets of stops angularly disposed to arrest the two-way movement of the matrix plate, and a key-board operably connected to adjust one stop from each set for bringing the selected character in the matrix field to the casting position at each operation of the key-board.

28. In a machine for casting type bodies, a type body mold, a matrix plate having a field of characters arranged for a two-way movement of the matrix plate, stops for bringing any selected character in the matrix field to the casting position, and a key-board operably connected with the stops whereby they can be adjusted by the key-board to bring the selected character to the casting position at each operation of the key-board.

29. In a machine for the production of type bodies, a type body mold, a matrix plate movable in two directions for the presentation of the selected character to the casting position, two sets of stops in angular relation for arresting the two-way movement of the matrix plate, and a key-board provided with finger keys, the operation of any one of which adjusts a stop from each set co-incident with its operation.

30. In a machine for casting type bodies, a type body mold, a two-way moving matrix plate, stops arresting the movement of the matrix plate in two directions, and a key-board operably connected with the stops adjusting them to bring the matrix plate into operative relation with the type body mold at each operation of the key-board.

31. In a machine for the production of type bodies in any desired order, a type body mold, a two-way moving matrix plate, stops arresting the movement of the matrix plate in two directions, a key-board operably connected with the stops adjusting them at each operation to bring a selected character on the matrix plate to a casting position, and means actuated by the key-board causing the matrix plate to complete a cycle of movement at each operation of the key-board.

32. In a machine for producing type bodies in any desired order, a type body mold, a two-way moving matrix plate, stops arresting the movement of the matrix plate in two directions, a key-board operably connected with the stops to adjust them at each operation for the presentation of a selected character on the matrix plate at the casting position, and means set in motion by the key-board to lock the matrix plate for the casting of the type body.

33. In a machine for the production of type bodies, a type body mold, a two-way moving matrix plate having a field of matrix characters thereon, stops arresting the movement of the matrix plate in two direc-

tions, a key-board operably connected with the stops having finger keys, the operation of any one of which adjusts the selected stops for bringing a character on the matrix field to the casting position co-incident with the operation of the finger key, and means actuated by the key-board causing the matrix plate to complete a cycle of movement.

34. In a machine for the production of type bodies, a key board, a type body mold, a two way moving tensioned matrix plate, and stops adjusted by the key board, when it is operated, to arrest the movement of the matrix plate, in two directions, for the presentation of a selected character to the type body mold.

35. In a machine for producing type bodies in any desired order, a matrix plate having a field of characters thereon, two sets of stops arresting the movement of the matrix plate in two directions, a type body mold co-acting with one set of stops to determine the type body size, and a key-board operably connected with each set of stops to adjust them at each operation of the key-board.

36. In a machine for producing type bodies in any desired order, a matrix plate having a field of characters thereon, two sets of stops arresting the movement of the matrix plate in two directions, a type body mold co-acting with one set of stops to determine the type body size, a key-board operably connected with each set of stops to adjust them for bringing a character on the matrix plate to the casting position at each operation of the key-board, and means actuated by the key-board for injecting metal into the type body mold.

37. In a machine for producing type bodies in any desired order, a matrix plate having a field of characters thereon, two sets of stops arresting the movement of the matrix plate in two directions, a type body mold co-acting with one set of stops to determine the type body size, a key-board operably connected with each set of stops to adjust them for bringing a character on the matrix plate to the casting position at each operation of the key-board, means actuated by the key-board for injecting metal into the type body mold, and other means actuated by the key-board for the delivery of the type body from the type body mold.

38. In a machine for casting type bodies, a two-way moving matrix plate having on its face a field of characters, a type body mold, a key-board mechanism and a stopping mechanism in operable relation with and actuated by the key-board mechanism whereby any desired character on the matrix plate may be brought contiguous to the casting position of the type body mold simultaneous with the operation of the key-board mechanism.

39. In a machine for casting type bodies, in combination, a two-way moving matrix plate having on its face a field of characters, a type body mold, stopping mechanism for arresting the two-way movement of the matrix plate, means for assembling the type bodies cast thereby, and means for introducing spacers into a line of assembling type bodies, with a key-board and connections whereby two stops are adjusted to bring any selected character on the matrix plate to a casting position simultaneously with the operation of the key-board and by which the spacers are selectively inserted into the line of assembling type bodies.

40. In a machine for the production of type bodies, a type body mold, a matrix plate movable in two directions, stops arresting the two-way movement of the matrix plate, a key-board operably connected with the stops, means to support the matrix plate in an inoperative position, and means to release the supporting means, the adjusting of the stops and the release of the supporting means being effected by, and co-incident with, each operation of the key-board.

41. In a machine for the production of type bodies, a type body mold, a two-way moving matrix plate, means holding the matrix plate in a normal position, stops arresting the movement of the matrix plate in two directions, a key-board operably connected with the stops and arranged to release the supporting means for the movement of the matrix plate in one direction, and operable means actuated by the key-board for the movement of the matrix plate in the other direction.

42. In a machine for the production of type bodies, a type body mold, a two-way moving matrix plate, means holding the matrix plate in a normal position, stops arresting the movement of the matrix plate in two directions, a key-board operably connected with the stops and arranged to release the supporting means for the movement of the matrix plate in one direction, operable means actuated by the key-board for the movement of the matrix plate in the other direction, and means for locking the matrix plate for the casting of the type body.

43. In a machine for casting type bodies, a two-way moving matrix plate having two or more fields of independently usable characters, an elevator for effecting a one-way movement of the matrix plate, adjustable means for positioning the elevator to bring any field into operative relation with a type body mold, and a key-board actuated mechanism controlling the movement of the elevator.

44. In a machine for casting type bodies from a two-way moving matrix plate, a tensioned matrix plate elevator, supporting

means holding the matrix plate elevator in its elevated position, a releasing means for the matrix plate elevator supporting means, operable means for lifting the matrix plate elevator, a key-board and intermediate mechanism for actuating the releasing means, for the movement of the matrix plate elevator in one direction, and for setting the operable lifting means in motion to return the elevator to its elevated position.

45. In a machine for casting type bodies, a matrix plate elevator, a supporting means therefor, a releasing slide engaging with the supporting means, a key-board and a stopping plate selector actuated by the key-board to remove the releasing slide and disengage the supporting means from the matrix plate elevator.

46. In a machine for producing type bodies in any desired order, a two-way moving matrix plate, stops arresting the movement of the matrix plate in one direction, one-way moving stop selectors adjusting the stops to arrest the movement of the matrix plate, and a key-board operably connected with the stop selectors whereby the operation of a finger key will actuate the corresponding stop selector.

47. In a machine for producing type bodies, a two-way moving matrix plate having characters disposed in rows in two directions, stops for arresting the movement of the matrix plate in one direction, stop selectors co-acting with the stops, and a key-board having character keys operably connected with the stop selectors whereby the operation of any character key will actuate a stop selector to adjust a stop to bring a selected row on the matrix plate into line with the casting position.

48. In a machine for producing type bodies in any desired order, a key-board, a tensioned matrix plate, stops for a one-way movement of the matrix plate, and a stop selector actuated by the key-board to position a stop and release the matrix plate for a one-way movement of the matrix plate.

49. In a key-board controlled mechanism for a machine for producing type bodies in any desired order, a tensioned matrix plate, an operative clutch mechanism and a stop selector arranged to position a one-way stop, to release the tensioned matrix plate to engage with a stop, and to release the operative clutch mechanism for the reproduction of the indicated character.

50. In a machine for the production of type bodies in any desired order, a tensioned matrix plate, stops for a one-way movement of the matrix plate, an operative clutch mechanism, and a key-board mechanism having a stop selector to position a one-way stop, to release the tensioned ma-

trix plate to engage with the latter, and to set the operative clutch mechanism for the reproduction of indicated characters on the matrix plate.

51. In a machine for the production of type bodies in any desired order, a two-way moving matrix plate, stops controlling the movement of the matrix plate in two directions, and detaining means for the matrix plate, a key-board, and selectors actuated by the pressing of a character key causing the co-incident actuation of the stops to arrest the movement of the matrix plate in two directions, and the release of the matrix plate from its detained position for its flight to the stops.

52. In a key-board mechanism for a machine for the production of type bodies, a stopping plate selector consisting of an elongated body portion having at one end a slide engaging heel and a stopping plate engaging finger.

53. In a machine for the production of type bodies bearing indicated and desired characters from a two-way moving matrix plate having multiple fields of characters, a stopping plate selector consisting of an elongated body portion, a transverse portion formed at one end with a slide engaging heel and having stopping plate engaging fingers arranged in relation to the fields of matrix plate characters.

54. A stop selector mechanism for a machine for producing type bodies consisting of a slide box, selecting slides mounted to reciprocate in the slide box and provided with selecting fingers, and a key-board mechanism causing the reciprocating movement of the selecting slides.

55. In a machine for the production of type bodies, a key-board, a type body mold, a two way moving tensioned matrix plate, stops adjusted by the key-board, when it is operated, to arrest the movement of the matrix plate, in two directions, for the presentation of a selected character to the type body mold, and means set in motion by the key-board to center and lock the selected character at the casting position.

56. In a machine for producing type bodies, a one-way moving shift plate having mounted thereon a two-way moving matrix plate, stops actuated by the key-board arresting the movement of the matrix plate in two directions, and operable means imparting to the shift plate a reciprocating motion transverse to the two-way movement of the matrix plate actuated by the manipulation of the key-board.

57. In a machine for the production of type bodies bearing indicated and desired characters from a matrix plate having a two-way movement in parallel relation, and a one-way movement in angular relation, to

a type body mold, a shift plate having a one-way movement in angular relation to the type body mold, and a key-board actuating the means to control the shift plate.

5 58. In a machine for producing type bodies bearing indicated and desired characters, a matrix plate having a two-way movement in parallel relation, and a one-way movement in angular relation, to a stationary type body mold, in combination with a shift plate having a one-way movement in angular relation to the type body mold, operable means actuating the shift plate, a key-board and intermediate means actuated
10 by the key-board controlling the motion of the operable means.

59. In a machine for casting type bodies, a matrix plate having matrix characters, key-board actuated stops for selecting any desired character on the matrix plate and positioning it opposite a type body mold, and means causing said stops and matrix plate to reciprocate for presentation to a type body mold.

60. In a machine for the production of type bodies bearing indicated and desired characters, a key-board mechanism, a matrix plate having characters arranged in two directions, two-way stops to select any desired character on the matrix plate actuated by the key-board mechanism and means causing said stops and matrix plate to reciprocate for presentation to a type body mold.

61. In a machine for the production of type bodies bearing indicated and desired characters, a type body mold, a matrix plate having a two-way movement for the presentation of a selected character to the type body mold and a one-way movement transversely to the two-way movement, a key-board, two sets of stops operatively connected with the key-board to arrest the movement of the matrix plate in two directions, and means actuated by the key-board for the transverse movement of the matrix plate.

62. In a machine for the production of type bodies in any desired order, a matrix plate having characters disposed in two directions, a key-board, stops operatively connected with the key-board whereby any of said characters may be brought to a common point by the movement of the matrix plate in two directions in angular relation to each other, a centering mechanism to accurately position the indicated character opposite a type body mold, and means for casting the type body.

63. In the herein described machine, a mold for producing type bodies with tapered recesses, space bars having tapered sides entering the tapered recesses of the type bodies and justifying them to a predeter-

mined width together with means for advancing the spacers to justify the type bodies to a predetermined width and means to withdraw and return the spacers to their storage chamber.

64. In a machine for the production of type bodies bearing indicated and desired characters reproduced from a matrix plate having two or more fields of characters and adjustable to bring any field into operative relation with a type body mold, a stopping plate comb and a set of stopping plates adjustable with the matrix plate, means for projecting a stopping plate into the path of the matrix plate and other means to restore the stopping plates to the comb.

65. In a machine for the production of type bodies bearing indicated and desired characters reproduced from a matrix plate having two or more fields of matrices and adjustable to bring any field into operative relation with the type body mold, a stopping plate comb and a set of stopping plates adjustable with the matrix plate, a stopping plate actuating means to project the stopping plates into the path of the matrix plates and a stopping plate return means adjustable with the stopping plate comb.

66. In a machine for the production of type bodies in any desired order, a type body mold, a matrix plate having characters disposed in two directions, two stops, a key-board arranged to actuate the two stops for the selection of any desired character on the matrix plate, and means set in motion by the key-board to return the stops and matrix plate to a normal position.

67. In a machine for the production of type bodies, a mold for casting type bodies having intermediate their ends a tapered side, a magazine containing plural spacing bars, each of which is provided with an end tapered to correspond with the tapered sides of the type bodies, and means for introducing into an assembling line of type bodies at proper intervals, from the magazine, the spacing bars.

68. In a machine for casting type bodies and assembling them into composed words, means for casting the type bodies with tapered sides, a space bar consisting of two converging sides and two other sides in parallel relation, the parallel sides having recesses near the point to receive the bars by which the space bar is supported within the composed line.

69. In a machine for casting type bodies and assembling them into composed words, means for casting the type bodies with tapered sides, a space bar consisting of two sides in parallel relation having recesses near the point to receive the bars by which the space bar is supported within the composed line, two other sides one of which is

inclined and converges with the other at the point, the space bar at the end opposite to the point having a recess to receive, and a detent tooth extending into the recess to engage with, a justification shoe.

70. In a machine for casting type bodies and assembling them into composed words, a space box, space bars contained in the space box having recesses in their sides near their points and yielding detent bars to engage in the recesses and retain the space bars during the advance of the line.

71. In a machine for casting type bodies and assembling them into composed words, a line assembling box having two sides in parallel relation with an unoccupied space between them for the passage of the auxiliary line carriage and space bars, and yielding detent bars in the inner faces of the parallel sides of the assembling box to support the space bars during the advance of the line.

72. In a machine for casting type bodies and assembling them within an assembling box into composed words, a line carriage arranged to enter into the assembling box composed of a stationary jaw and a movable jaw and means to unlock the movable jaw and clamp the type against the stationary jaw and means to withdraw the whole from the assembling box.

73. In a machine for casting type bodies and assembling them into composed words within a line assembling box, an aliner bar to correspond with a recess cast within the type bodies slightly yielding for retaining the type bodies in their endwise position.

74. In a machine for the production of type bodies in any desired order, a matrix plate having characters disposed in two directions, a key-board, and stops operatively connected with the key-board whereby said characters may be brought to a common point in front of a mold by means of the stops when actuated by the key board, and a type body mold having a body liner adjusted, by the setting of the stops, to a predetermined position.

75. In a machine for the production of type bodies having a type body mold and a matrix plate having characters disposed in two directions, stops for positioning any desired character on the matrix plate opposite the type body mold together with means actuated by the positioning of one of the said stops to conform the type mold to the desired character.

76. In a machine for the production of type bodies bearing in relief indicated and desired characters, a type body mold, a two-way moving matrix plate, a key-board, intermediate mechanism actuated by the key-board controlling the movement of the matrix plate in two directions in angular relation and means for determining the size of

the type body to be cast actuated by the means controlling the movement of the matrix plate.

77. In a machine for the production of type bodies bearing indicated and desired characters, a type body mold, a matrix plate having a field of characters arranged in rows in one direction with regard to size relation and in another direction without regard to size relation, two sets of stopping means controlling the movement of the matrix plate in two directions, a key-board actuating the two sets of stopping means, and a mold adjusting means actuated by the set of stopping means selecting the row of matrix characters having regard to size relations.

78. In a machine for the production of type bodies bearing indicated and desired characters, reproduced from a matrix plate having characters arranged in rows in one direction with regard to size relation and in rows in another direction without regard to size relation, a type body mold, a key-board, stops for arresting the movement of a matrix plate in two directions and means actuated by the stopping means determining the size of the type body to be cast by the type body mold.

79. In a machine for casting type bodies, a key board, a matrix plate controlled by the operation of the key board, stops arresting the movement of the matrix plate in one direction having operative relation with the key board, a type body mold having a variable mold cavity and means for determining the size of the mold cavity actuated by the stops set by the operation of the key board.

80. In a machine for casting type bodies from a matrix plate controlled by the operation of the key board, a type body mold having a variable mold cavity, a key board, stops arresting the movement of the matrix plate in one direction having operative relation with the key board, and intermediate means actuated by the stops to determine the size of the mold cavity.

81. In a machine for casting type bodies from a two-way moving matrix plate controlled in two directions by the operation of a key-board, a type body mold having a variable mold cavity, a wedge and intermediate mechanism for adjusting the size of the mold cavity, a wedge setting plate connected with the wedge, a key-board, a drop bar released by the key-board, a push bar pendently supported by the drop bar and operable means actuating the push bar to move the wedge setting plate and wedge.

82. In a machine for casting type bodies from a two-way moving matrix plate, stopping plates for arresting the movement of the matrix plate in one direction consisting of a drop bar, a stopping plate projected by the drop bar into the path of the matrix

plate, and key-board actuated means for releasing the drop bar to project the stopping plate.

83. In a machine for casting type bodies 5 from a two-way moving matrix plate, a stopping means for arresting the movement of the matrix plate in one direction consisting of a drop bar, a stopping plate projected by the drop bar into the path of the 10 matrix plate, a latch bolt normally holding the drop bar in an inactive position and a key-board mechanism releasing the latch bolt from its engagement with the drop bar.

84. In a machine for casting type bodies 15 from a matrix plate controlled by the operation of a key-board mechanism, a stopping means for arresting the movement of the matrix plate in one direction consisting of a drop bar, a stopping plate projected into 20 the path of the matrix plate by the actuation of the drop bar and means for restoring the drop bar and stopping plate to their normal position.

85. An organized machine for the production of type bodies bearing indicated characters, consisting of a key-board, two-way stops actuated therefrom, a matrix plate with characters set in two directions to co-operate with the two-way stops, a type body 30 mold arranged to coöperate with one stop and determine the type body size, a metal pot arranged to inject metal within the mold to form the type body, means for opening the type body mold ejecting the type body 35 therefrom to an assembling mechanism combined with a storage chamber for spacers, means for introducing the spacers in the line of assembling type bodies at proper intervals, means for advancing the spacers to 40 justify the type bodies to a predetermined width, and means to withdraw and return the spacers to the storage chamber and means to lock the line of assembled and justified type bodies.

86. In a machine for casting type bodies, 45 a type body mold, a matrix plate, a matrix plate carriage having a slideway for the movement of the matrix plate in one direction independently of the matrix plate carriage, a matrix plate holder permitting of 50 the independent movement of the matrix plate in the slideway and the united movement of the matrix plate with the matrix plate carriage, and key board actuated 55 means bringing about the movements of the matrix plate and matrix plate carriage.

87. In a machine for casting type bodies, a matrix plate carriage having a slideway for the independent movement of the matrix plate in one direction, carriage guides extending from the sides of the slideway, a 60 buffer for one of the carriage guides, and buffer springs interposed between the buffer and the slideway.

88. In a machine for casting type bodies, 65 a matrix plate carriage having a vertical slideway for the matrix plate, carriage guides extending from the sides of the slideway, a horizontal slideway within one of the carriage guides, a buffer plate movable 70 therein, buffer springs cushioning the movement of the buffer plate, a lever arm connected with the buffer plate and means for actuating the lever arm.

89. In a machine for casting type bodies, 75 a matrix plate carriage having a one-way movement in a fixed path, and an actuating means for the matrix plate carriage consisting of a rock shaft, an arm fixed on the rock shaft and connected with the matrix 80 plate carriage, pins projecting from the rock shaft, collars slidable on the pins, stationary arms above the pins and springs connected with slidable collars and stationary arms.

90. In a machine for casting type bodies, 85 a matrix plate carriage having a one-way movement in a fixed path in parallel relation to a type body mold, a two-way moving matrix plate movable in one direction independently of the matrix plate carriage and 90 in the other direction unitedly with it, and key-board actuated means causing the independent movement of the matrix plate and the combined movement of the matrix plate and matrix plate carriage. 95

91. A machine for casting type bodies comprising a type body mold, a matrix plate having a field of characters each of which may be selectively positioned by a two way 100 movement of the matrix plate, a key board, positioning means in the path of the matrix plate and operative means connected with the key-board whereby a matrix character is selected for presentation to the type body mold co-incident with each manipulation of 105 the key-board.

Washington, D. C., February 26th, A. D. 1909.

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Witnesses:

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