

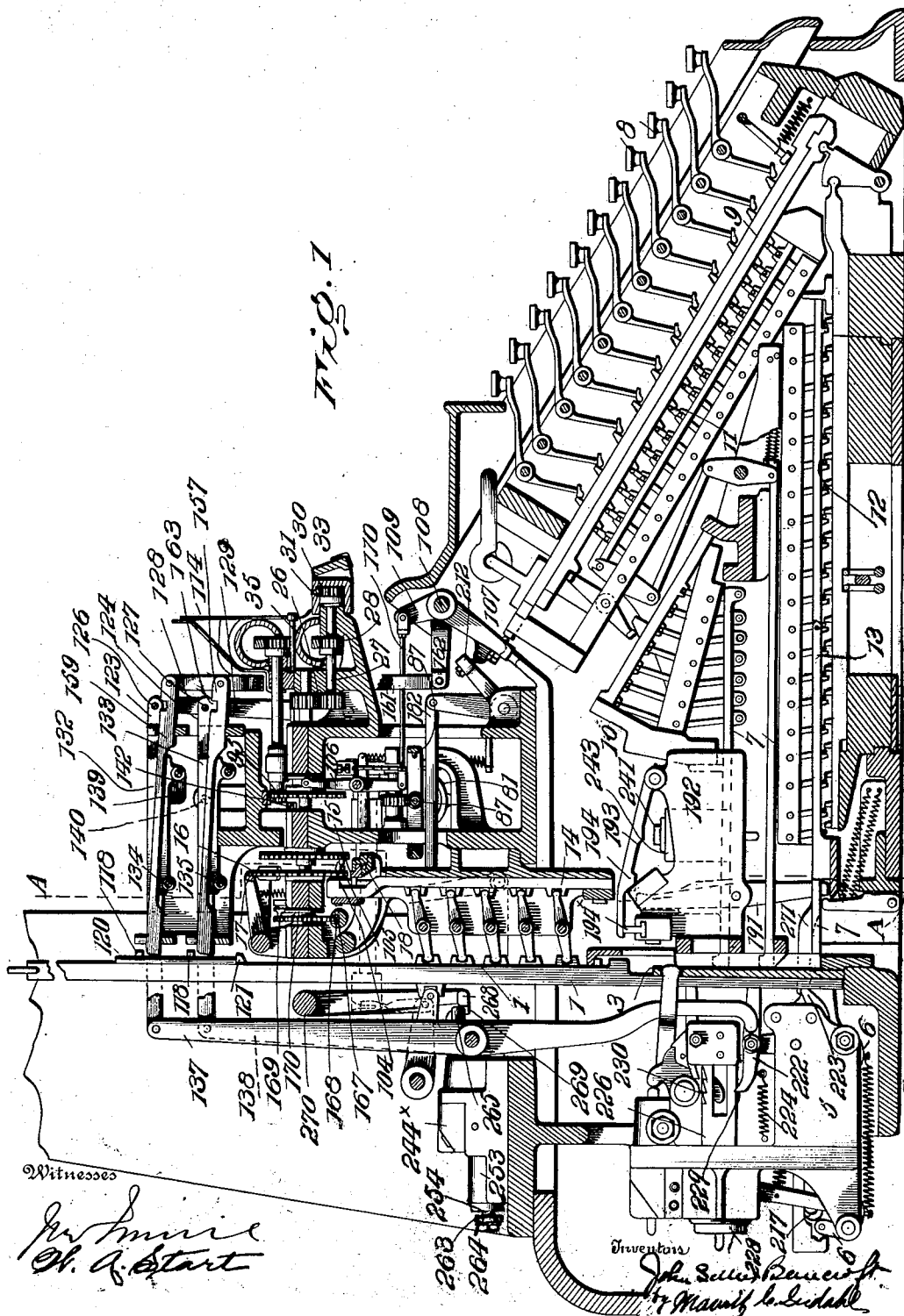
J. S. BANCROFT & M. C. INDAHL.
RECORD STRIP COMPOSING MACHINE.

APPLICATION FILED OCT. 25, 1904.

Patented Oct. 26, 1909.

22 SHEETS—SHEET 1.

938,298.



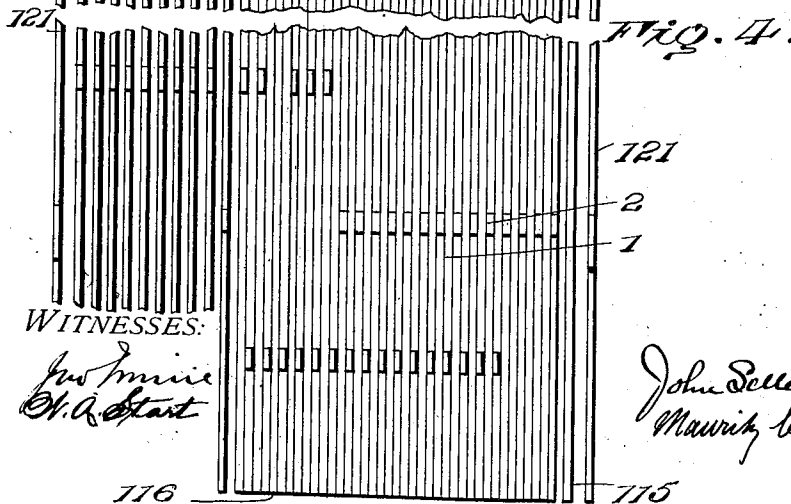
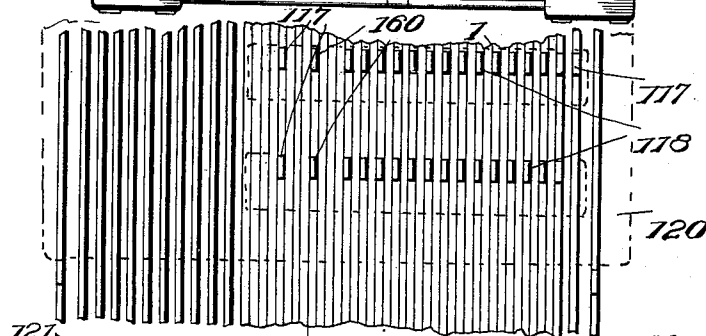
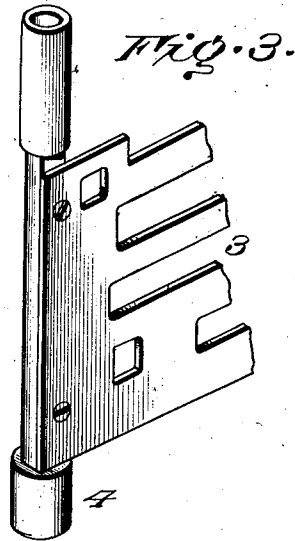
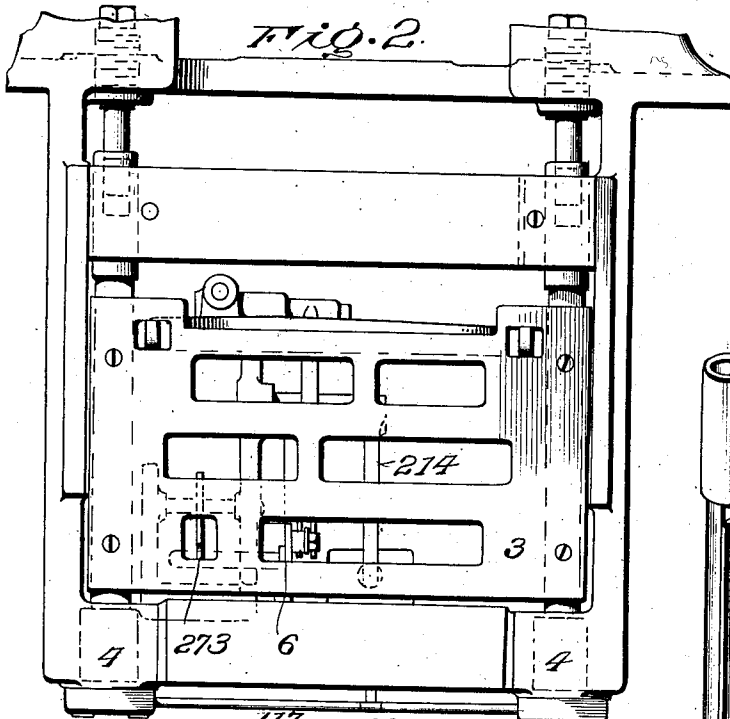
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22 SHEETS—SHEET 2.



WITNESSES:

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22 SHEETS—SHEET 3.

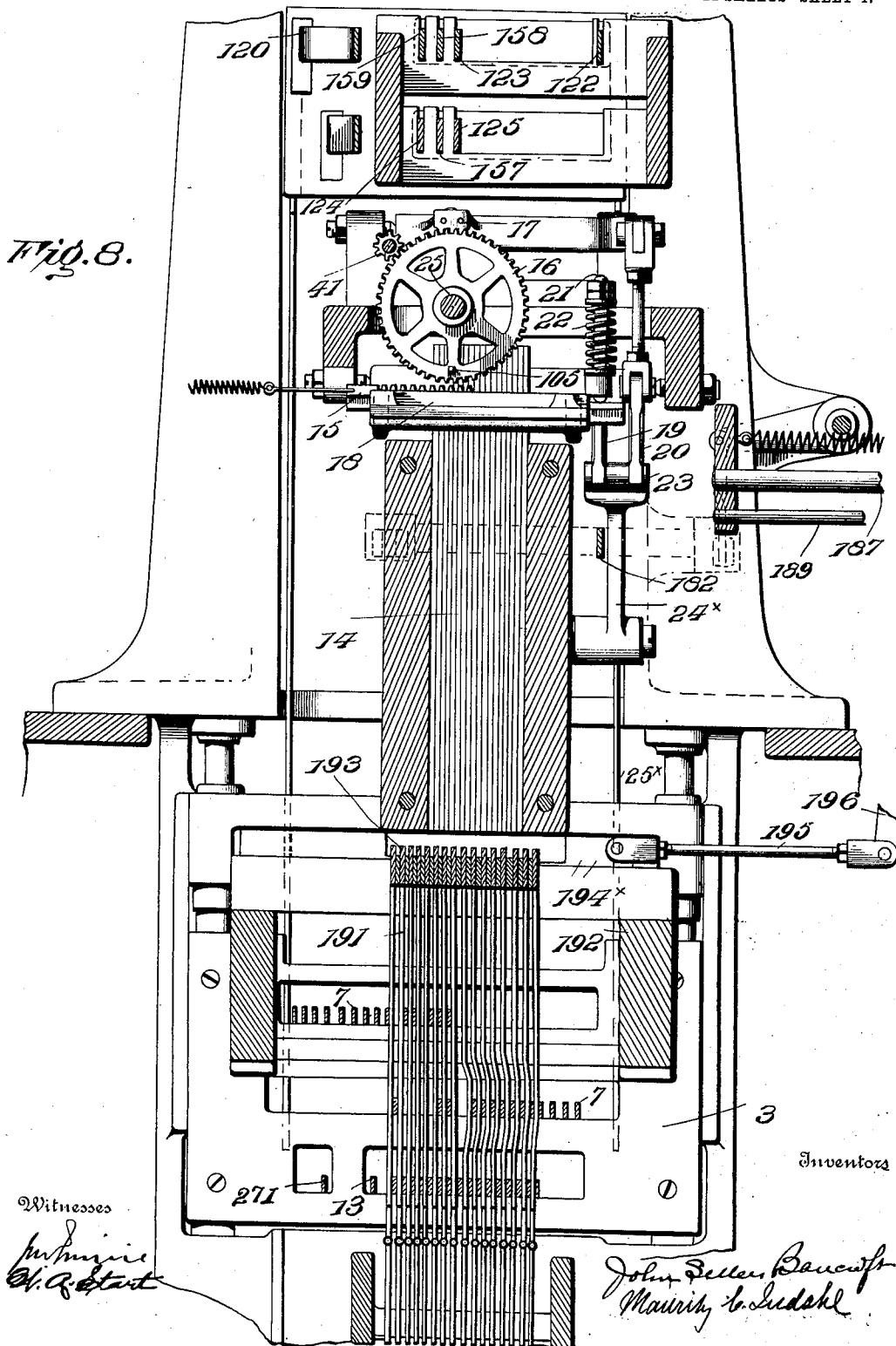


Witnesses
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APPLICATION FILED OCT. 25, 1904.

22 SHEETS—SHEET 4.



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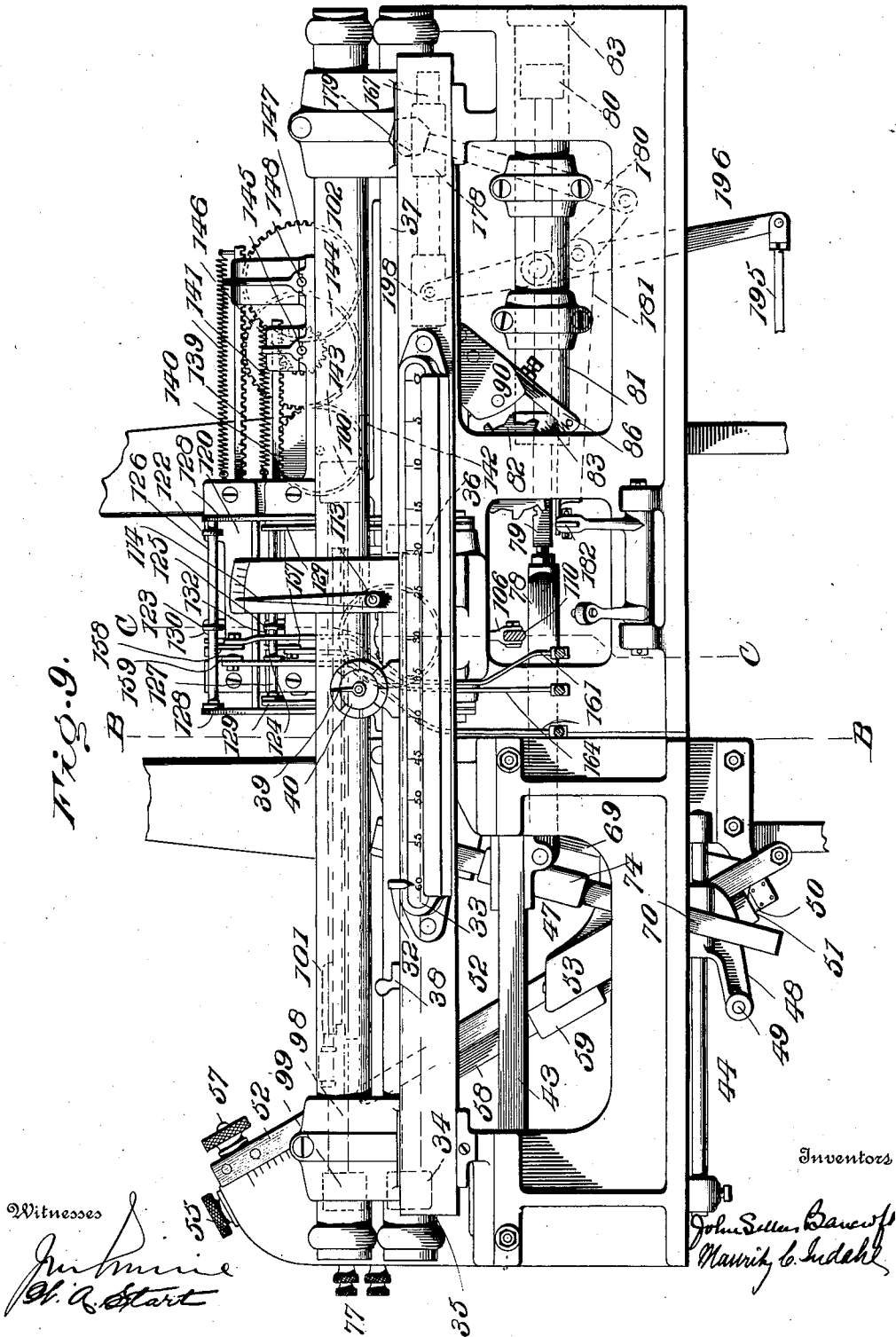
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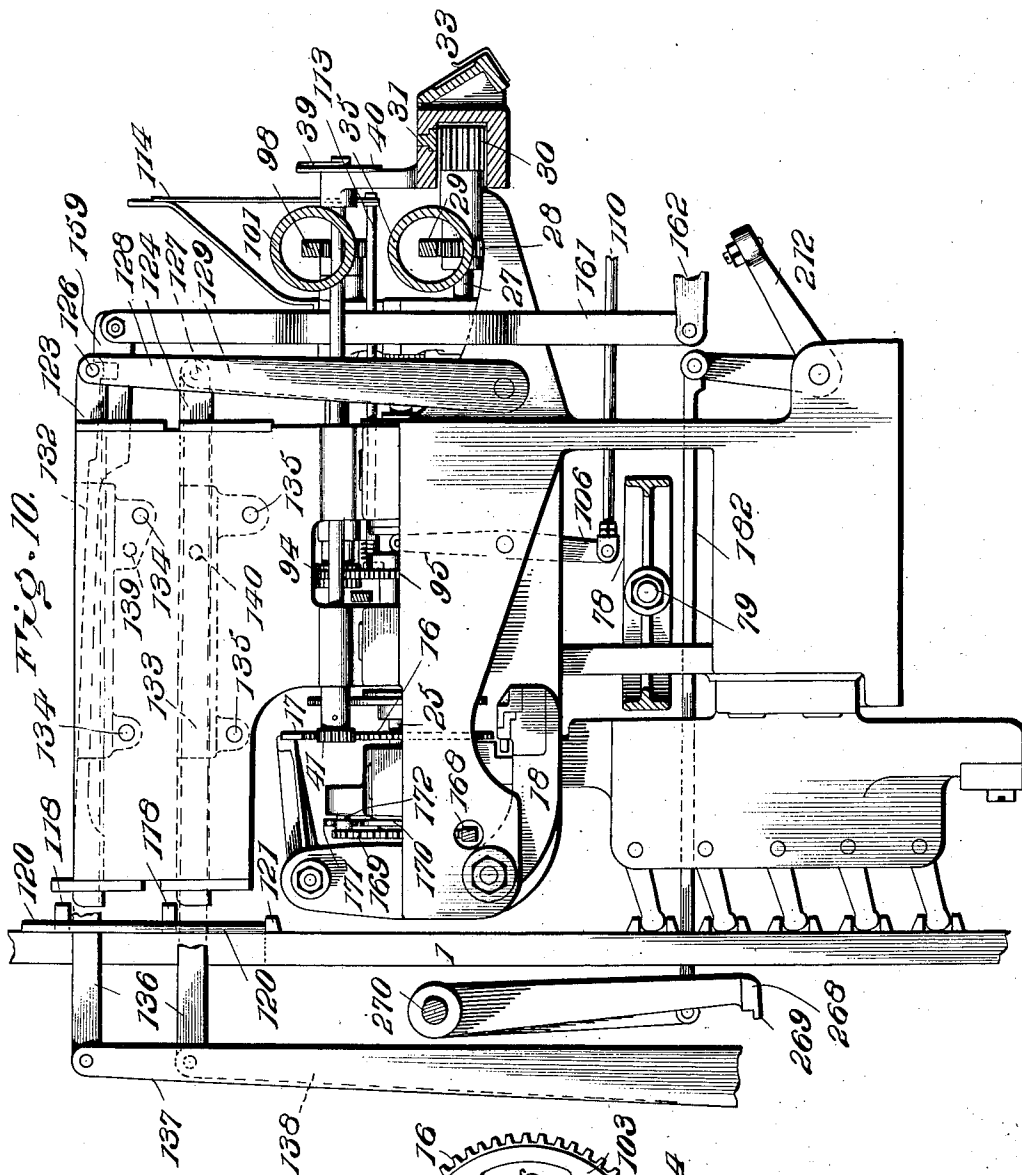
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J. S. BANCROFT & M. C. LINDAHL.
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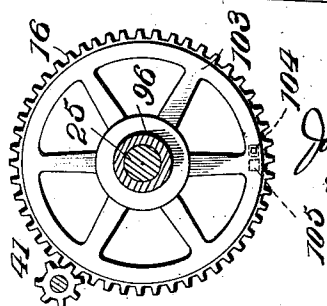
938,298.

Patented Oct. 26, 1909.
 22 SHEETS—SHEET 6.



Witnesses.
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Fig. 11.



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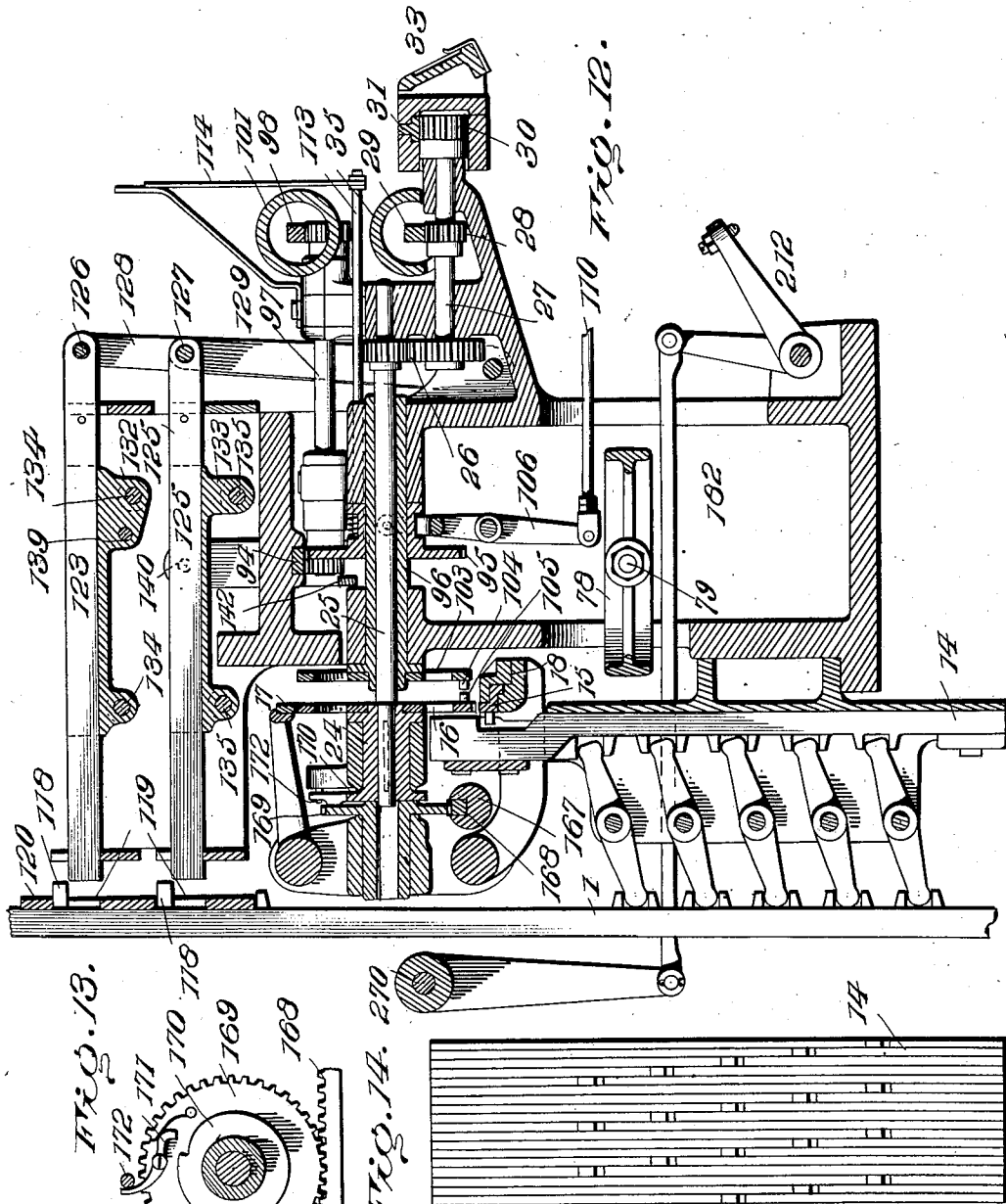
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938,298.



Witnesses

W. A. Start

Inventors
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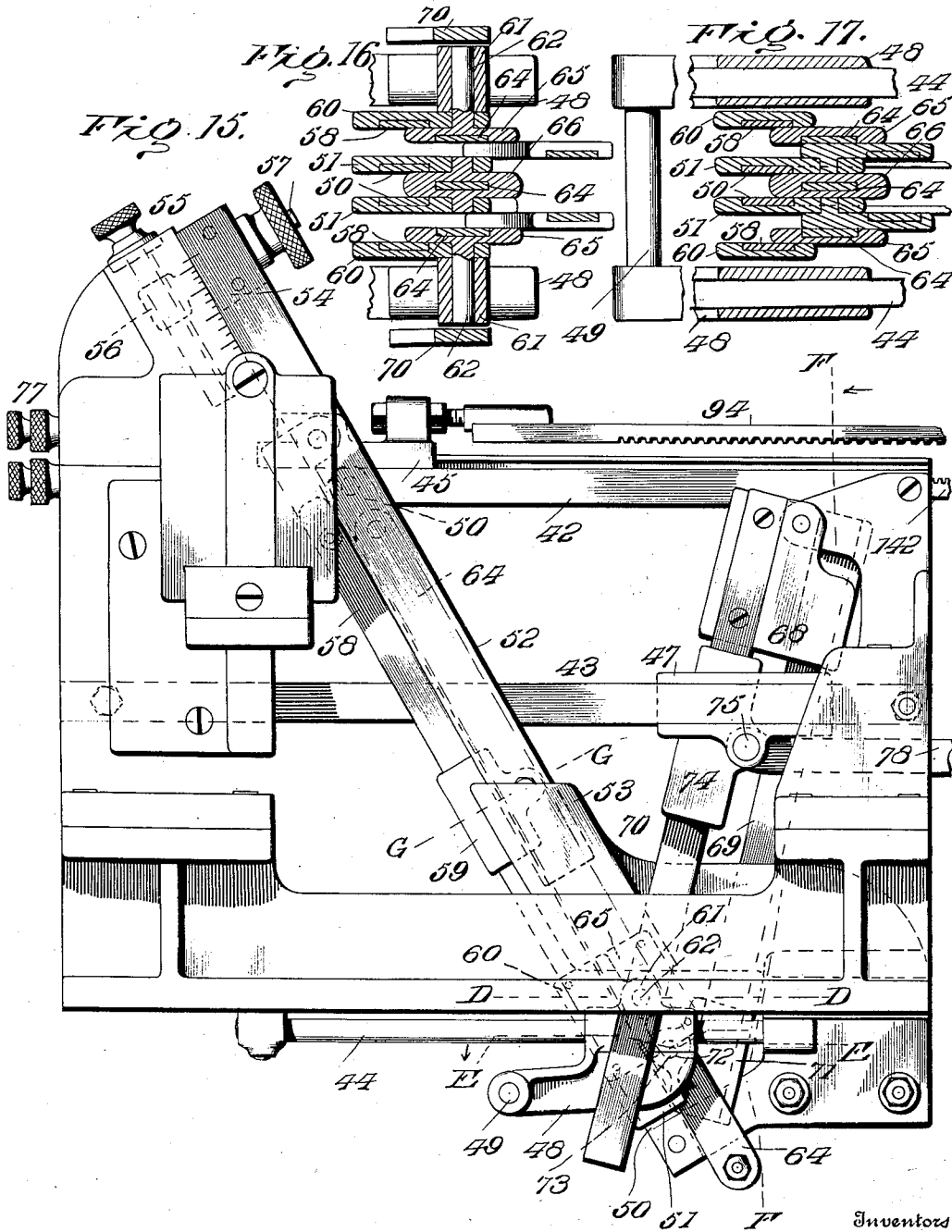
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22 SHEETS—SHEET 8.

938,298.



Witnesses

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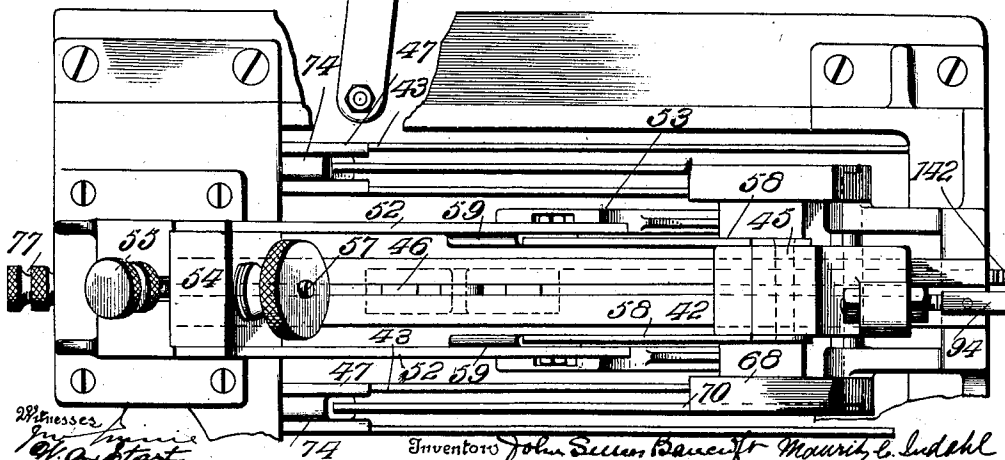
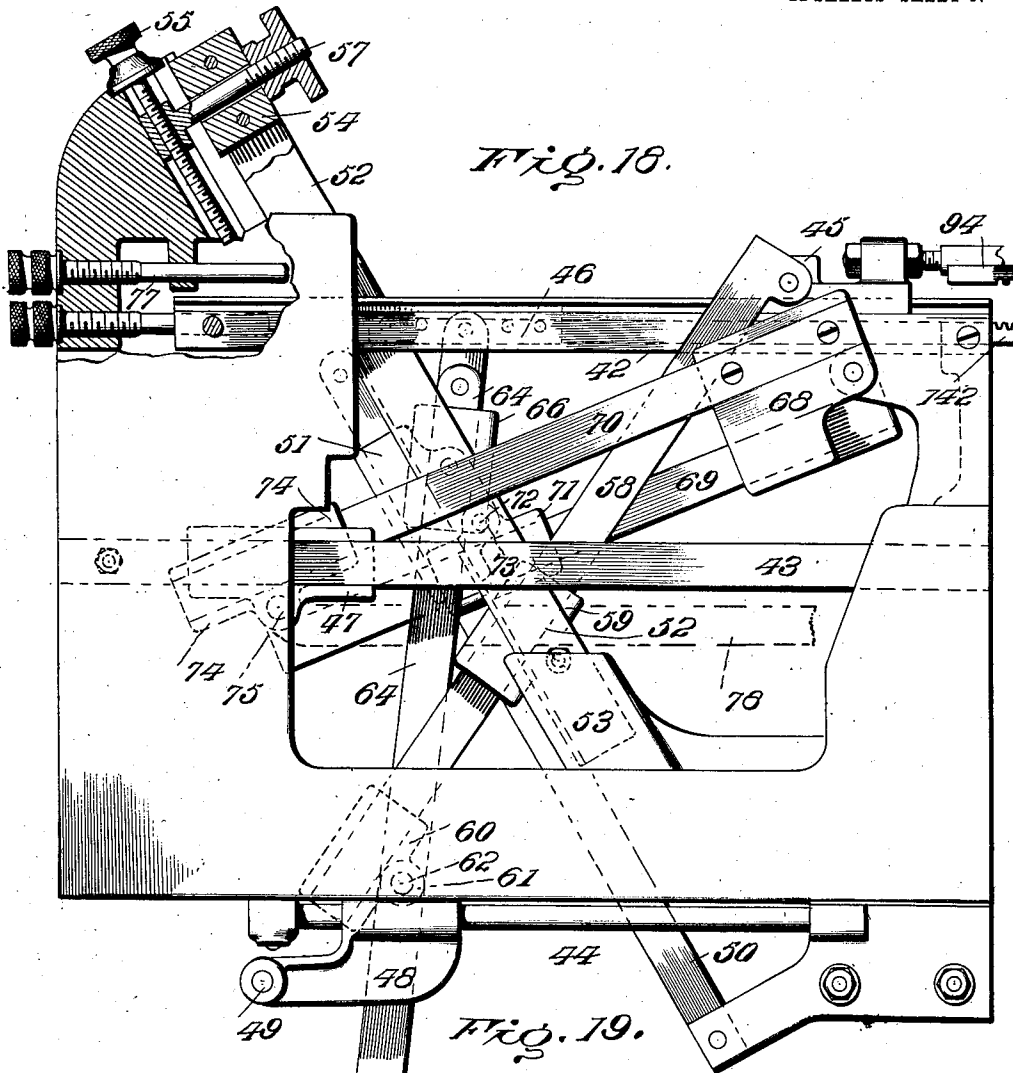
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22 SHEETS—SHEET 9.

938,298.



281 Messer

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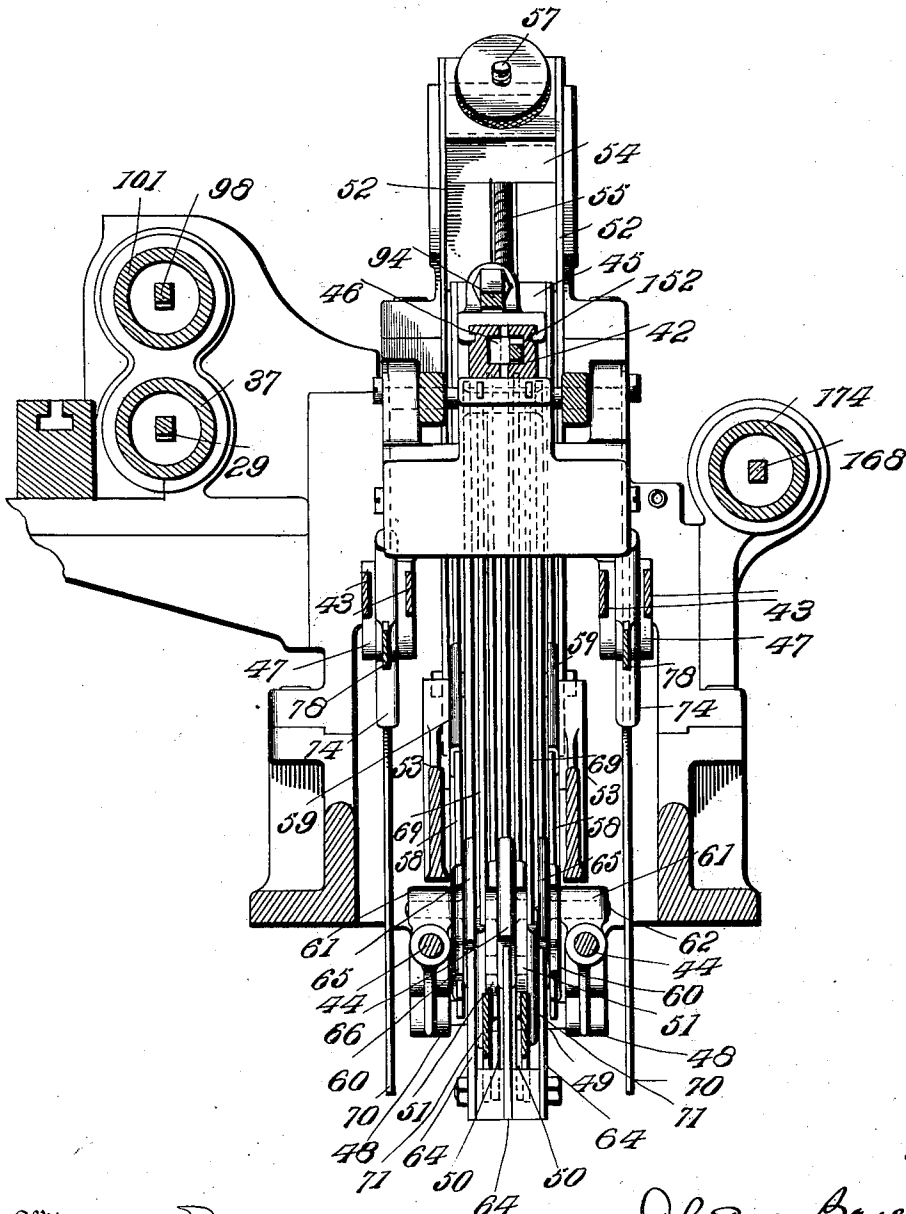
John S. Bancroft & Maurice C. Indahl

J. S. BANCROFT & M. C. INDAHL.
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938,298.

Patented Oct. 26, 1909.
 22 SHEETS—SHEET 10.

FIG. 20.



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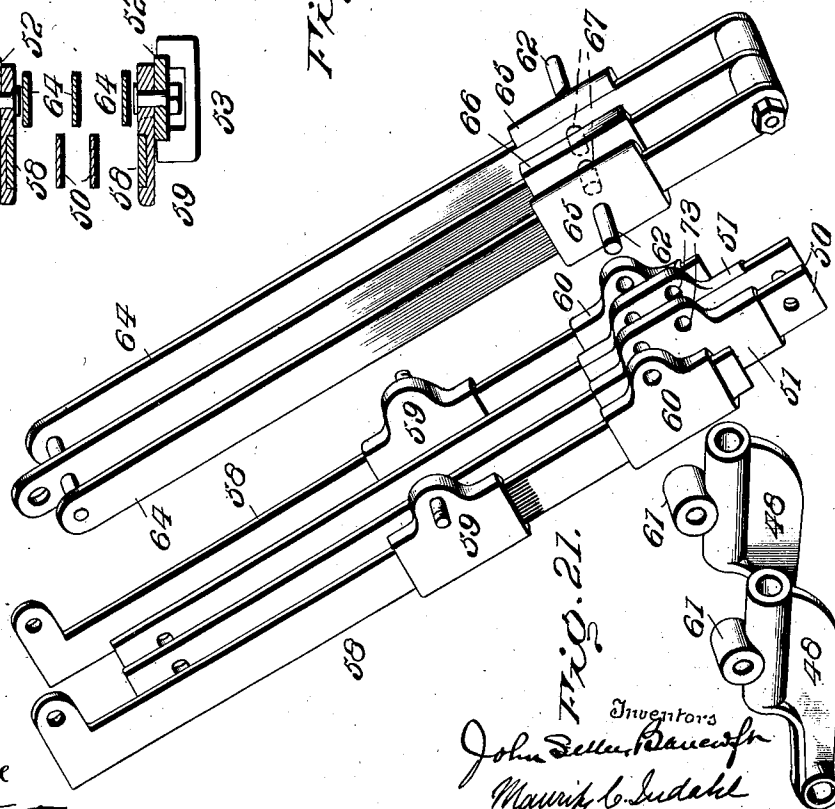
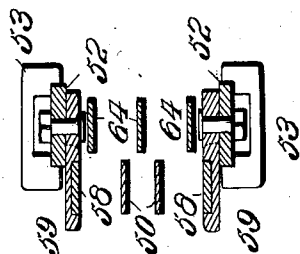
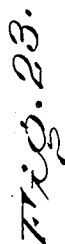
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APPLICATION FILED OCT. 25, 1904.

22 SHEETS—SHEET 11.



Aug. 27.

Witnesses

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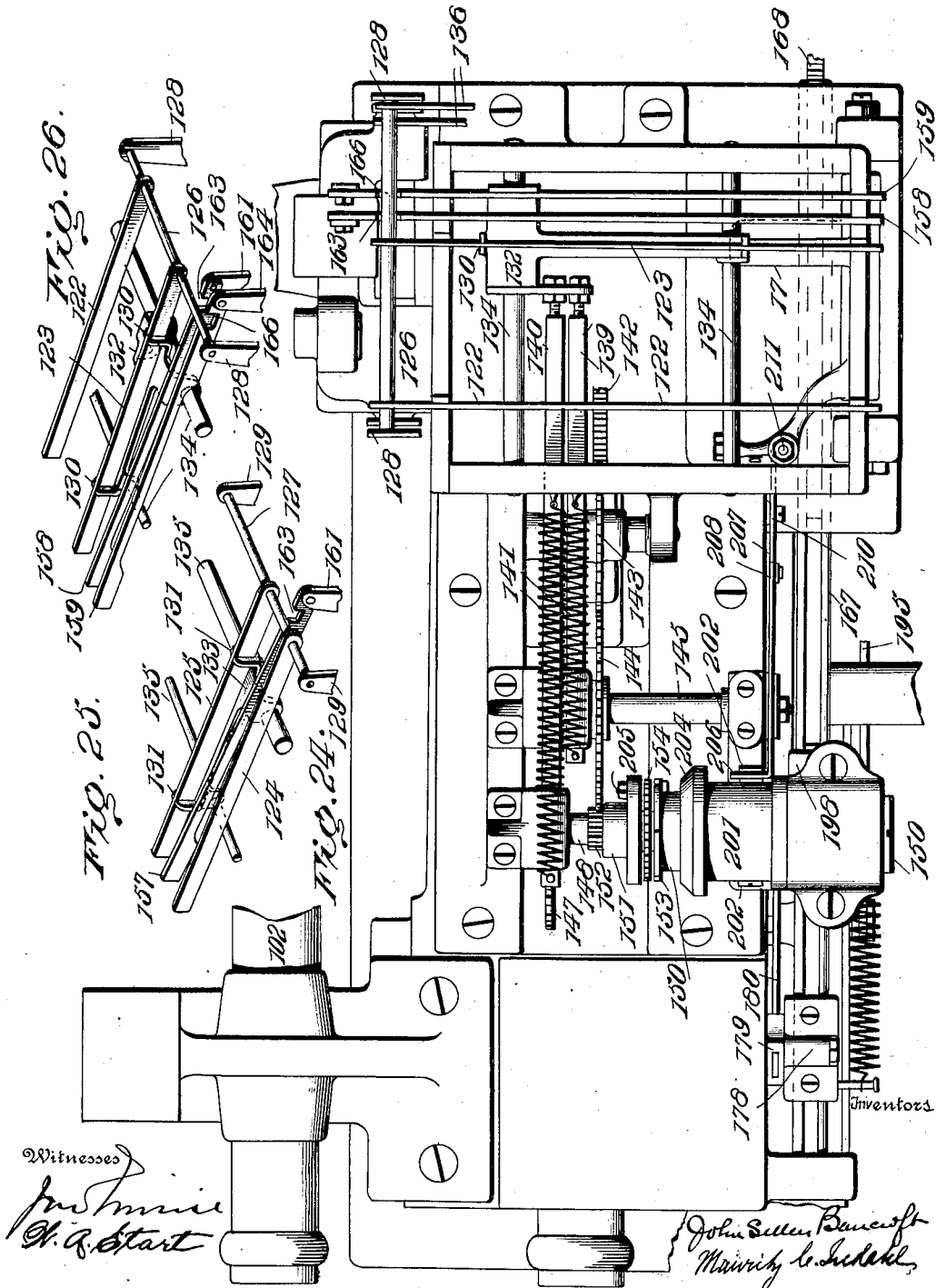
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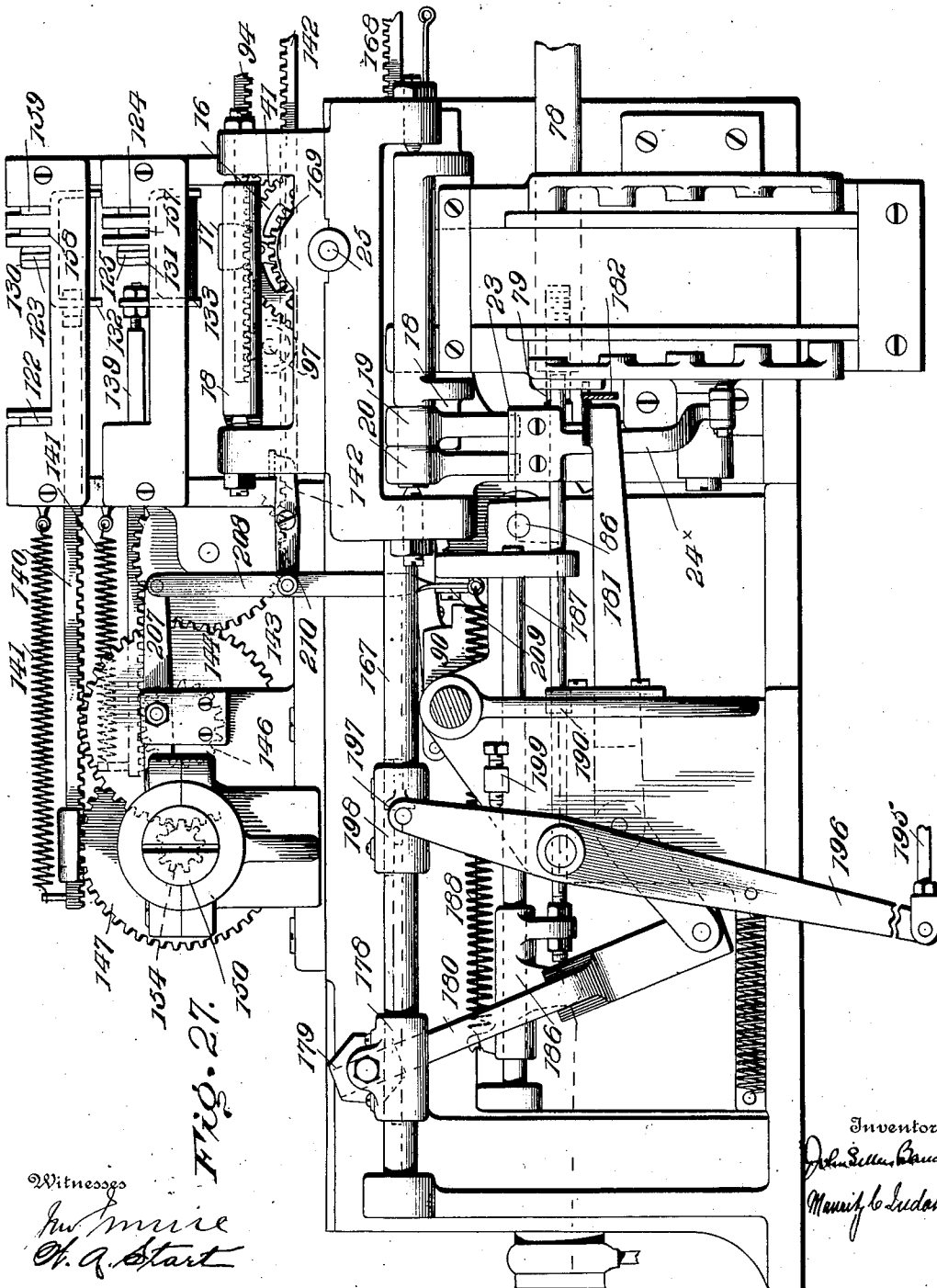
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22 SHEETS—SHEET 13.

938,298.



Witnesses

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Patented Oct. 26, 1909.

22 SHEETS—SHEET 14.

938,298.

Fig. 29.

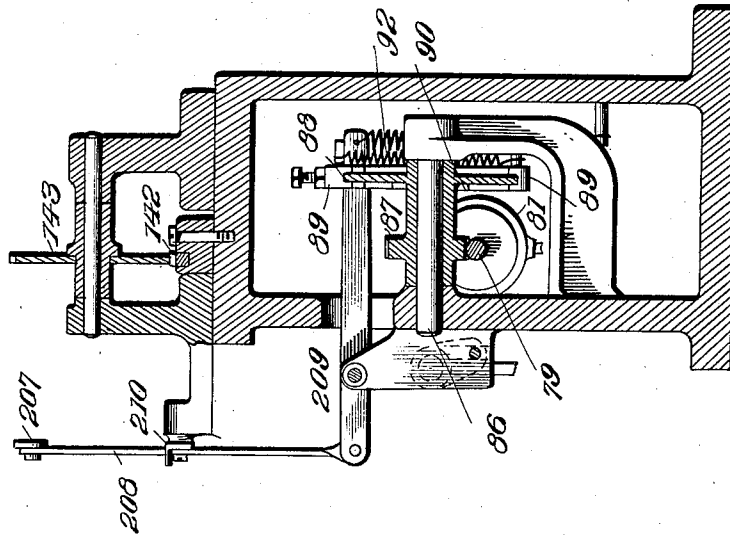
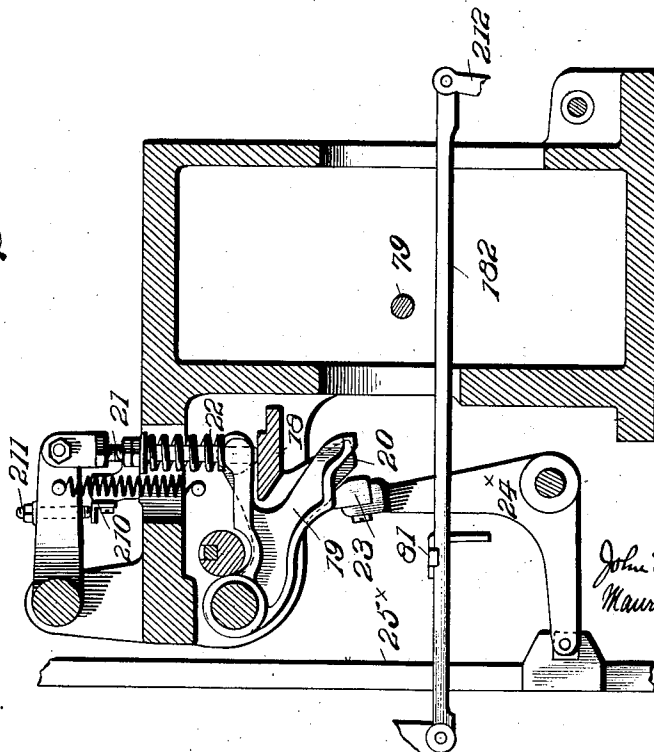


Fig. 28.



Witnesses

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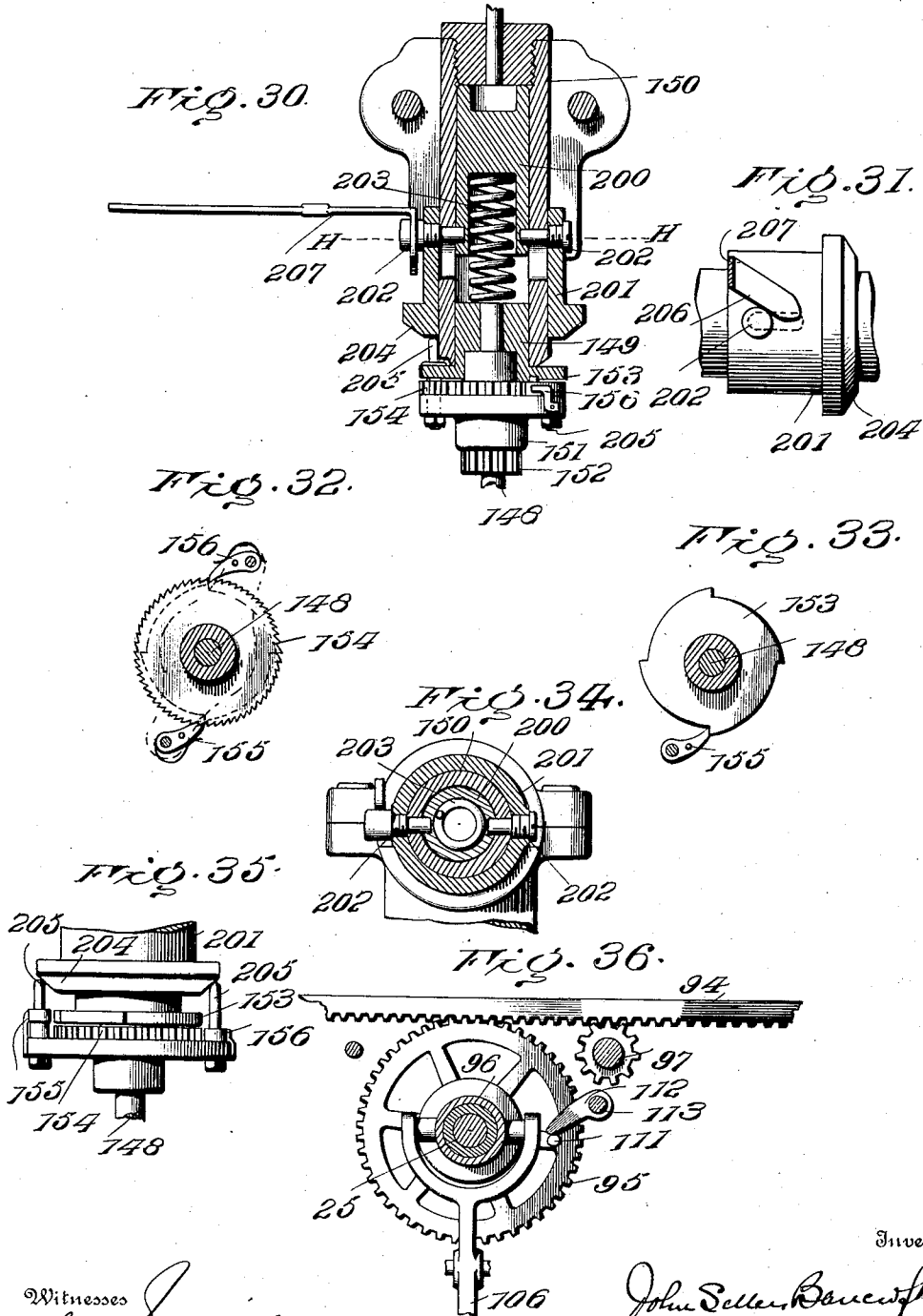
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22 SHEETS—SHEET 15.



Witnesses

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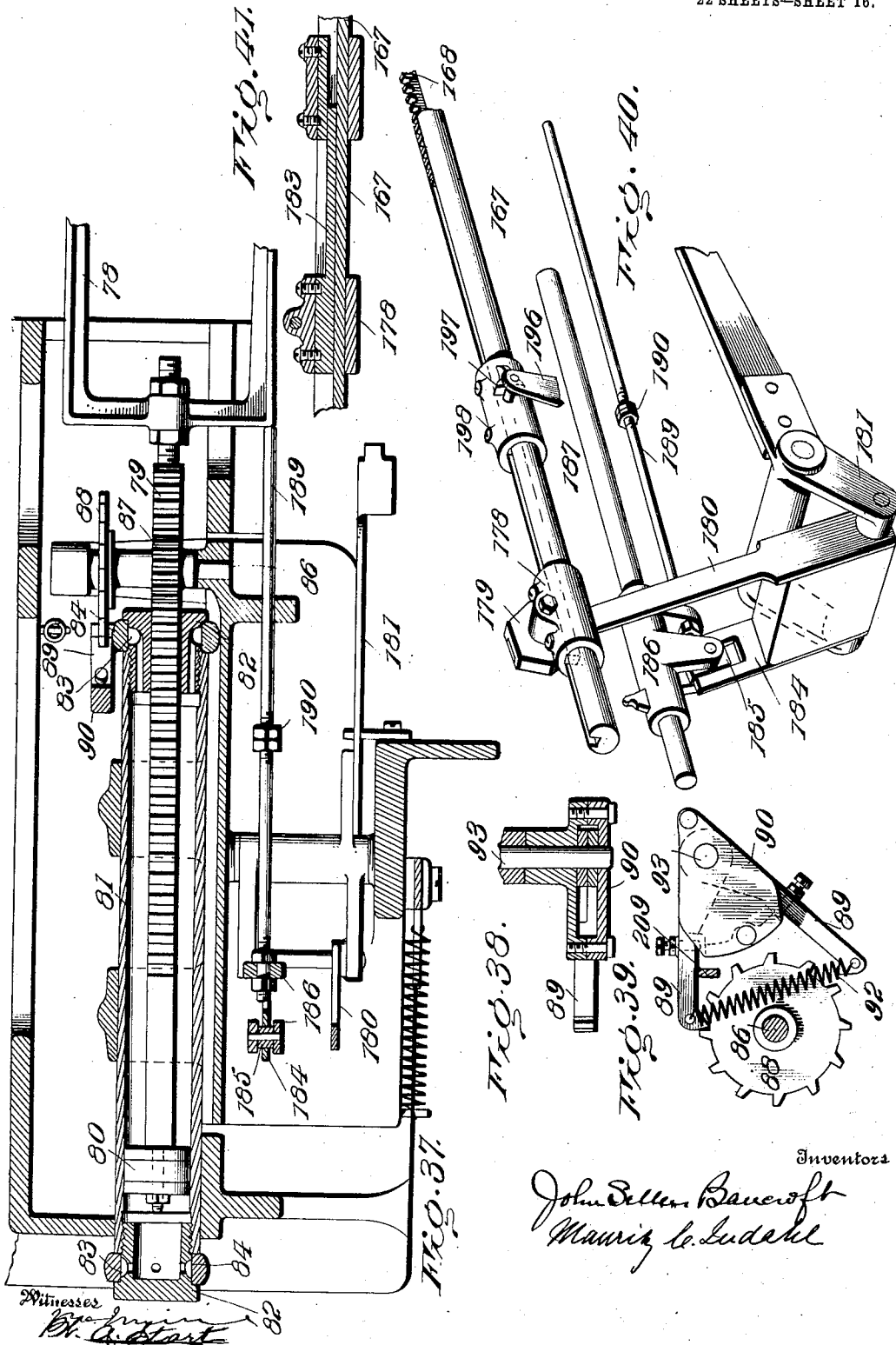
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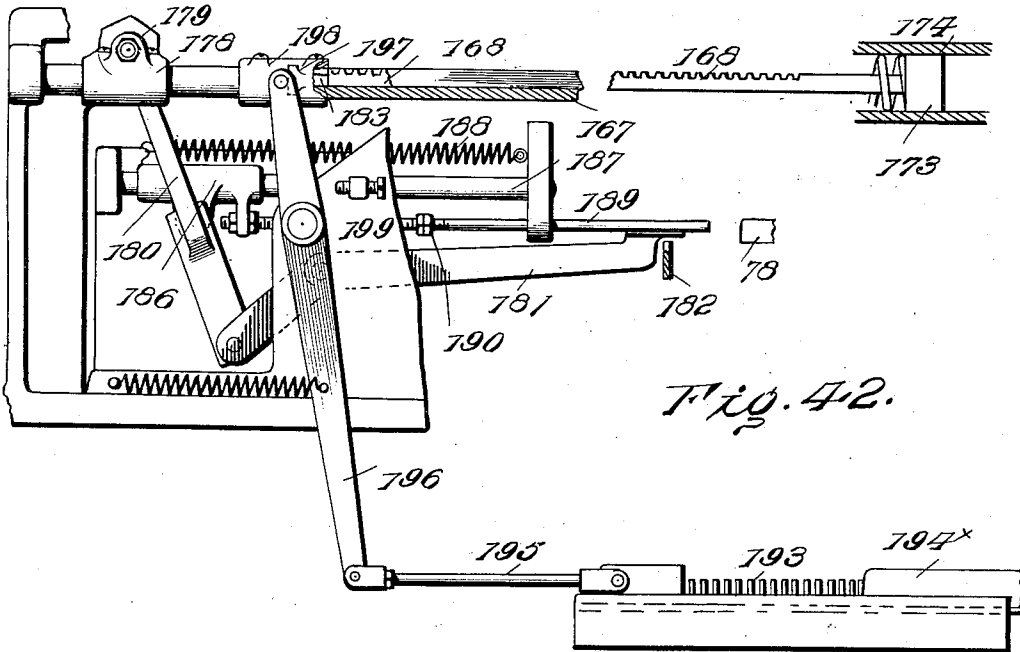


Fig. 42.

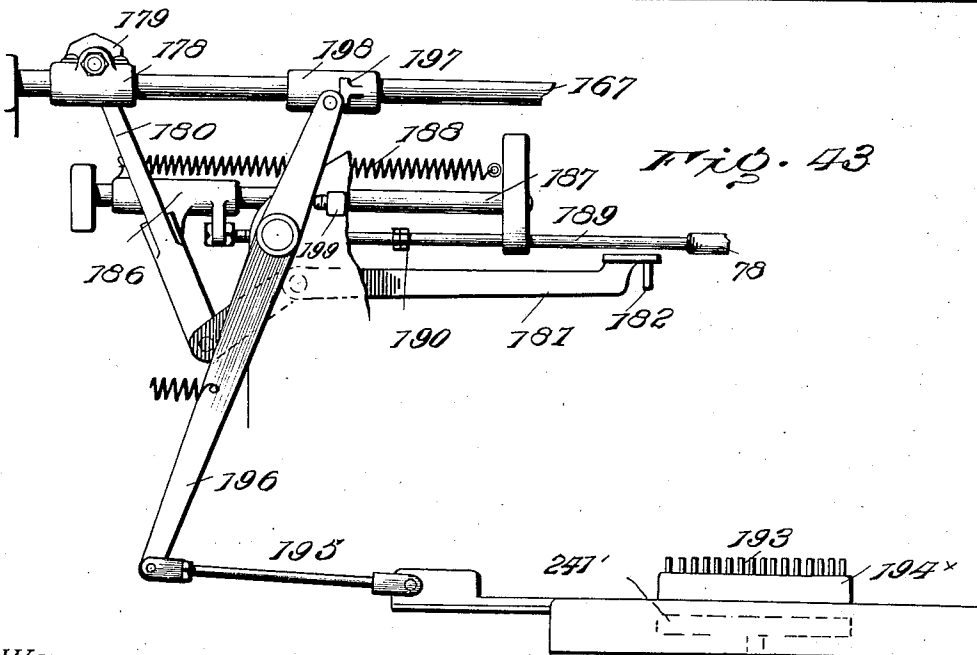


Fig. 43.

WITNESSES:

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22 SHEETS—SHEET 18.

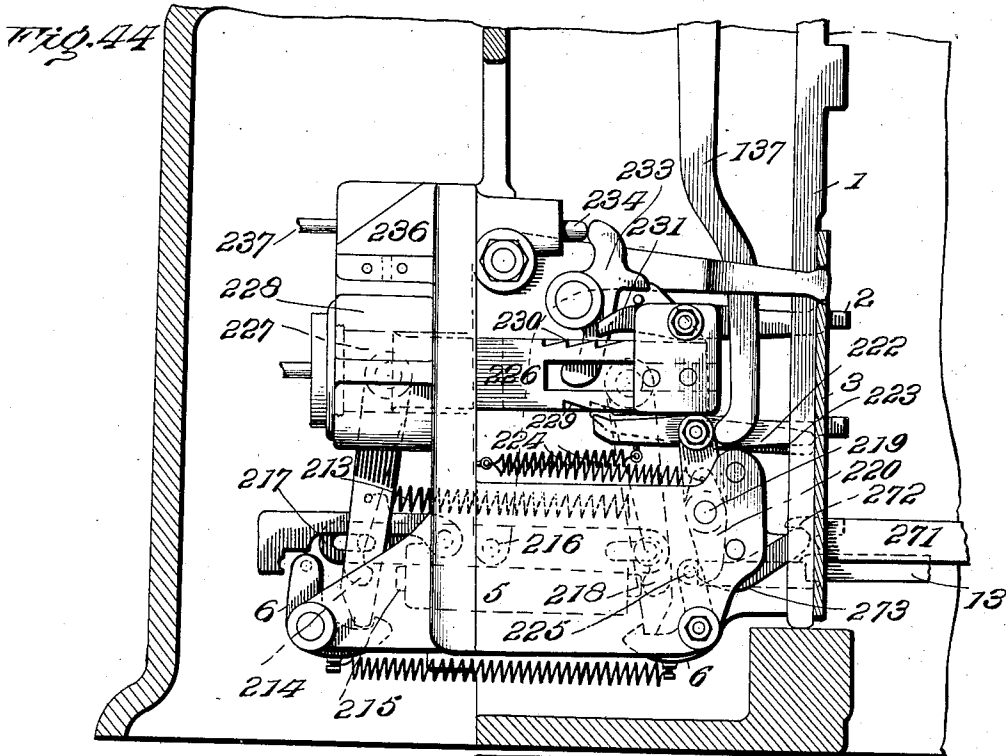
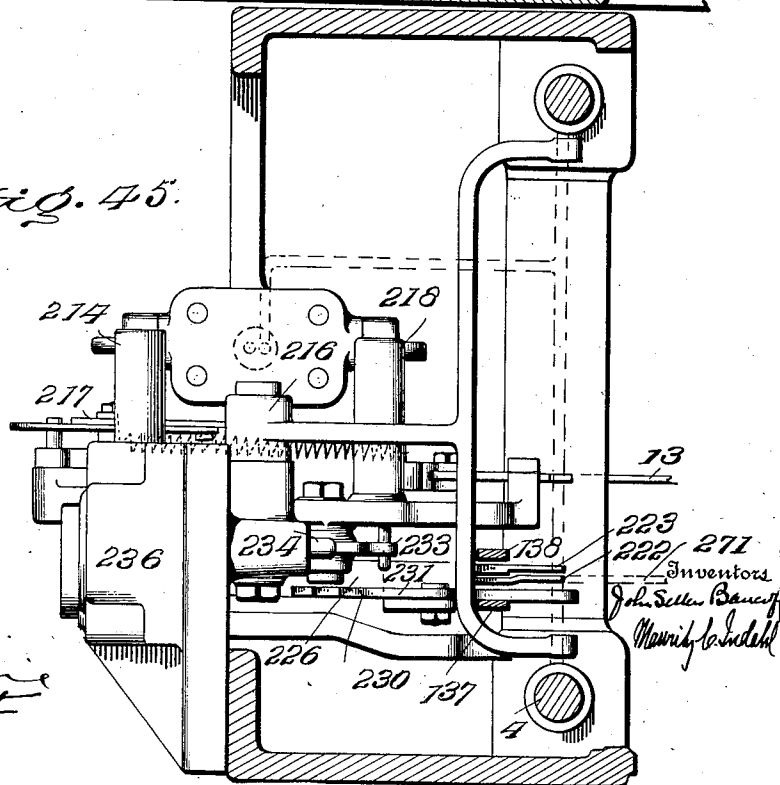


Fig. 45.



Witnesses

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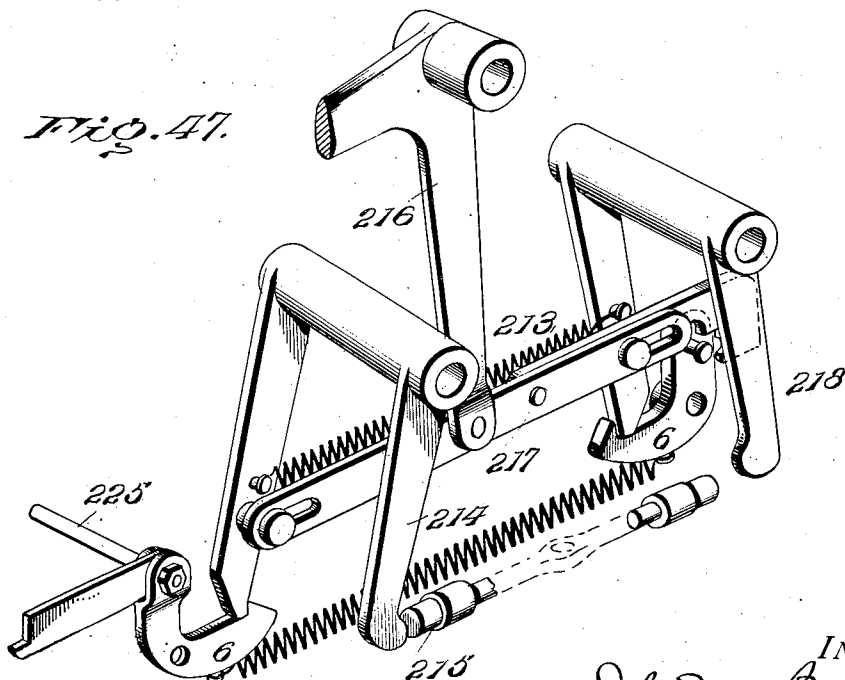
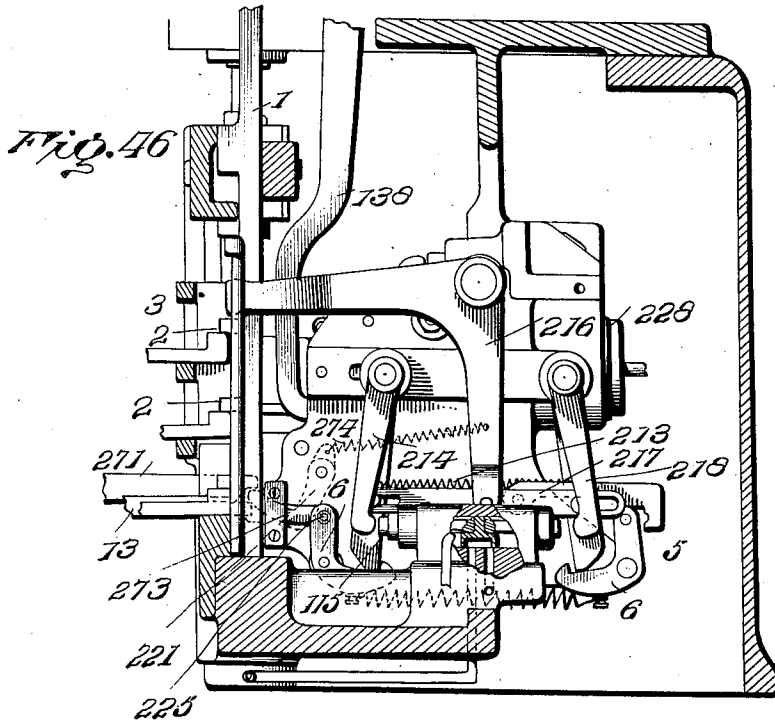
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RECORD STRIP COMPOSING MACHINE.

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938,298.

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22 SHEETS—SHEET 19.



Witnesses
G. H. Miller
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INVENTORS
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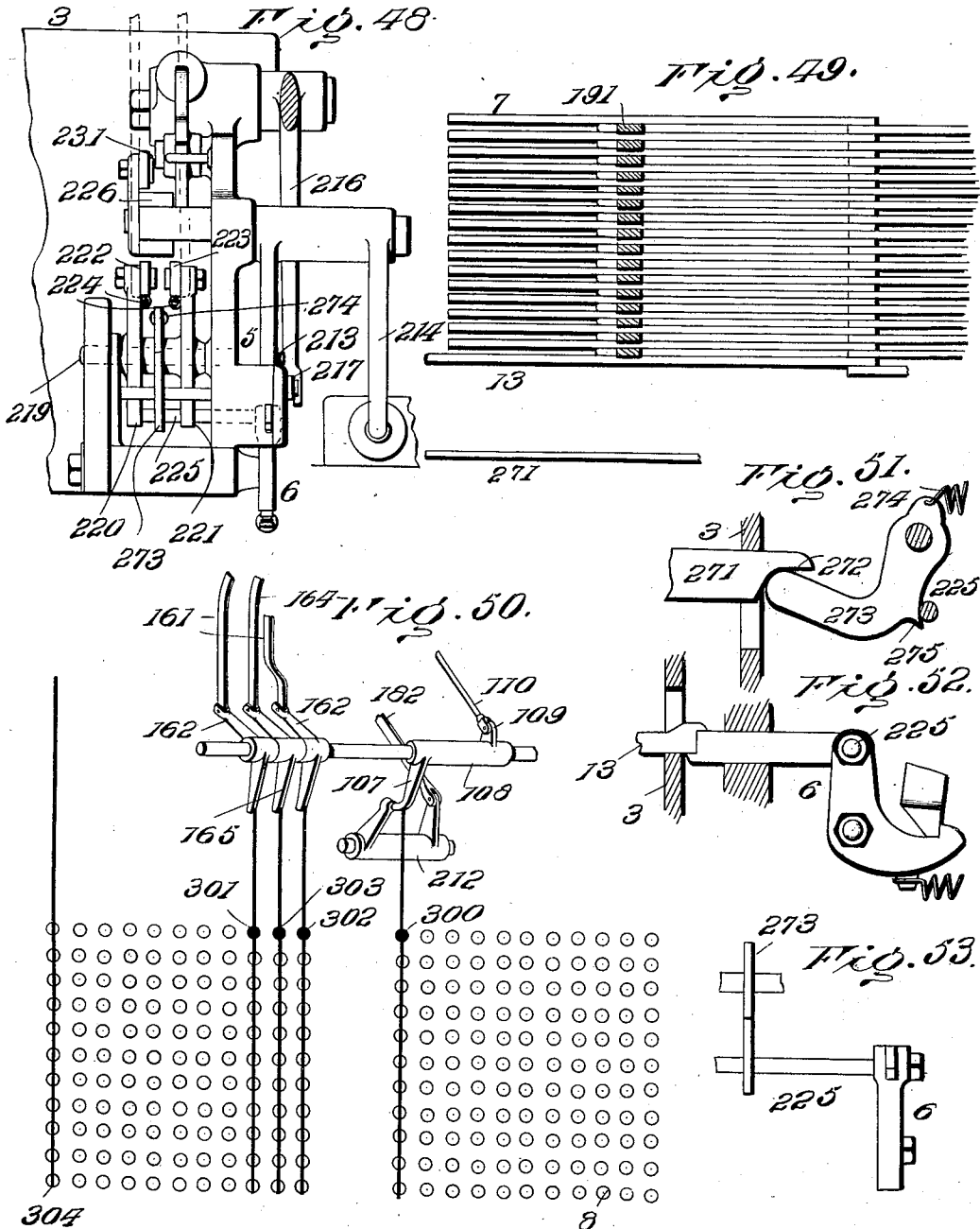
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APPLICATION FILED OCT. 25, 1904.

938,298.

Patented Oct. 26, 1909.

22 SHEETS—SHEET 20.



Witnesses

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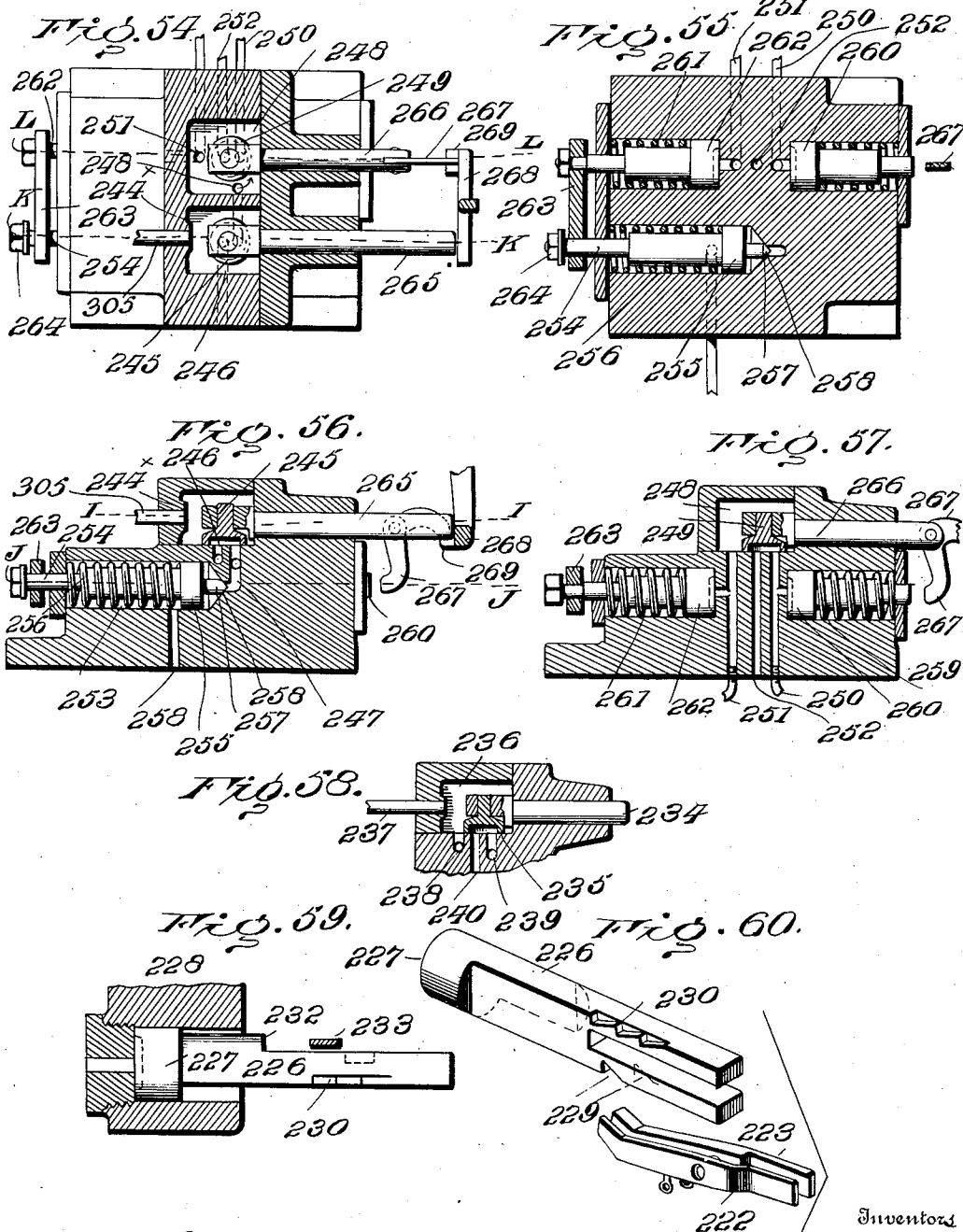
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APPLICATION FILED OCT. 25, 1904.

938,298.

Patented Oct. 26, 1909.

22 SHEETS—SHEET 21.



Witnesses

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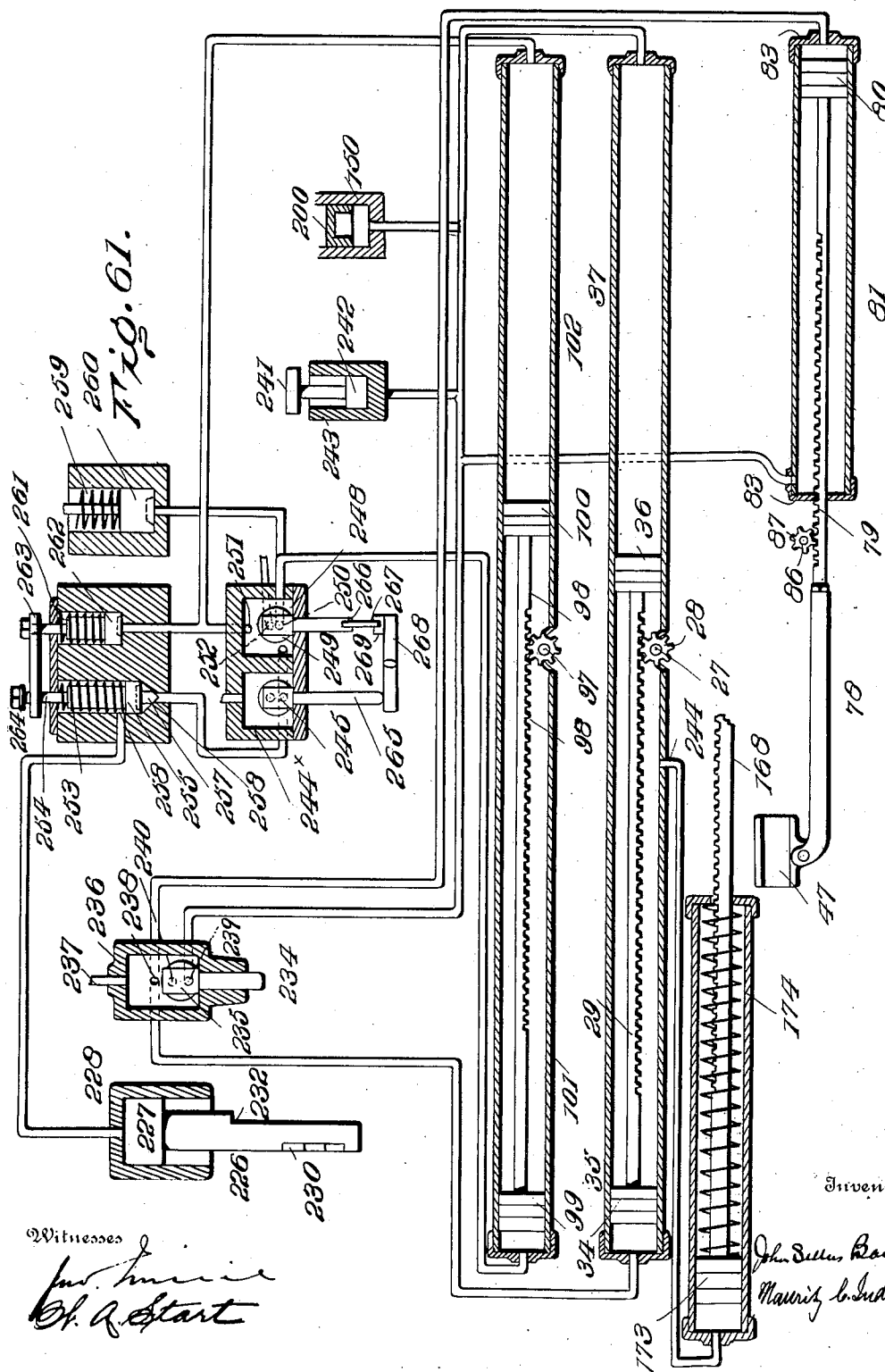
John S. Bancroft
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RECORD STRIP COMPOSING MACHINE.

Patented Oct. 26, 1909.

22 SHEETS—SHEET 22.

938,298.



Witnesses

Witnesses
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UNITED STATES PATENT OFFICE.

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RECORD-STRIP COMPOSING-MACHINE.

938,298.

Specification of Letters Patent.

Patented Oct. 26, 1909.

Application filed October 25, 1904. Serial No. 229,911.

To all whom it may concern:

Be it known that we, JOHN SELLERS BANCROFT and MAURITZ C. INDAHL, of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain Improvements in Record-Strip Composing-Machines; and we do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and to the figures of reference marked thereon.

This invention relates to the class of composing machines employed in the production of controllers or record strips for automatic type casting, setting, writing and analogous machines. These controllers or record strips, so called, are, in effect, patterns for controlling the action of automatic machines, wherein the characters and spaces are each represented by an individual signal, usually in the form of one or more perforations, said signals being arranged successively in the order of composition and in sections representing lines of predetermined length, and where the types of a section are insufficient to fill out the line there is associated with its signals one or more additional signals, known as the justification signal, whose function it is to increase certain of the spaces by an amount equal in the aggregate to the deficiency of the line. The signal most commonly employed for the purpose is a perforation or combination of perforations possessing distinguishing characteristics, such as number, location etc., and the composing machine is equipped with key controlled punching, measuring and indicating mechanisms, whereby the various type signals are successively formed by depressing the keys appropriate thereto, the space occupied is measured and the indicator set to disclose on a chart the justifying fraction, or the keys representing the same, which latter are to be operated at the conclusion of the line to produce the proper justification signal or signals. Examples of such machines are to be found in Patents Nos. 628,620 and 654,115.

In effecting justification, errors are liable to occur owing to inattention, carelessness or mistake on the part of the operator; moreover there is liability of error in bringing the lines to standard length, as when the justification signal is produced before the

line has entered the justification area, or composition is continued beyond said area. Attempts have been made to cure the first of these defects by the introduction of a pattern or index (prearranged to represent different justification signals and controlled in its application by the line measuring mechanism and the space signal devices) and causing said pattern to be brought into action to automatically produce the designated justification signal or signals when the line is finished, as illustrated, for example, in Patent No. 545,697. This too is objectionable inasmuch as the preparation of the justification pattern or index is an extremely delicate and difficult task; and as the ratio varies with different "sets" or sizes of fonts, a separate pattern is required for each.

The present invention has for its principal objects to provide an automatic justification signal selecting or designating mechanism in which the selection of the dimensioning signal element is effected by direct measurement, as distinguished from a predetermined pattern or charted index, whereby it can be used with any system of type proportioning (em fractions or decimal) and so that by adjustment it can readily be adapted for use in connection with different sets or fonts of type; to prevent accidental overrunning the line, by providing a long-line lock-out for the type signal devices and so coupling the same with the line measuring devices that only those type signals whose width exceeds the unoccupied space remaining in the line will be thrown out of action; to prevent short or unjustified lines, by providing a short line preventer or lock-out for the justification or line closing devices adapted to render the latter inoperative during the formation of a line of type signals and until the justification area is reached; to provide means whereby any designated signal may be automatically repeated; and, generally, to enlarge the capacity, improve the structure, supply omissions, and correct defects in prior mechanisms,—all as hereinafter fully described, the novelties being pointed out in the appended claims.

In the accompanying drawings illustrating a preferred form of embodiment—Figure 1 is a vertical transverse section through the automatic measuring and justification signal selecting mechanism, the

punch bars, keyboard connections and controlling valve mechanism being shown in end elevation and the frame in section. Fig. 2 is a front elevation of the main actuator plate, showing guiding devices, motor and valve connections. Fig. 3 is a perspective of one end of the actuator. Fig. 4 is a front elevation of the series of punch bars showing the arrangement of off sets. Fig. 5 is a sectional view above the justification control valve and operating devices showing the arrangement of said parts and the connections between the dimensioning punch bars and stop bars, and the space punch-bar and escapement shaft of the divisor element. Fig. 6 is a perspective of the justification space punch-bar and its connection with the escapement shaft of the divisor element. Fig. 7 is a detail view of a portion of the starting devices for the justification mechanism. Fig. 8 is a partial vertical section on the line A—A, Fig. 1. Fig. 9 is a front elevation of the upper portion of Fig. 1 containing the deficiency measuring and dividing devices, the justification signal selecting mechanism, the short and long line preventers, and associated parts. Fig. 10 is a vertical section on line B—B of Fig. 9. Fig. 11 is a detail of the connection between the units wheel and the automatic deficiency dividing system. Fig. 12 is a vertical section on line C—C of Fig. 9. Fig. 13 is a detail of the pick up connection between the units wheel and the short and long line preventers. Fig. 14 is a rear elevation of the stop-bars for the units or line measuring devices. Fig. 15 is a front elevation of the proportional divider lever system, with the parts in normal or starting position. Fig. 16 is a section of the levers on the line D—D of Fig. 15. Fig. 17 is a section of the levers on the line E—E, of Fig. 15. Fig. 18 is a front elevation partly in section and the frame in outline of the proportional divider lever system in operating position. Fig. 19 is a top plan view of the parts shown in Fig. 15. Fig. 20 is a vertical section on the line F—F, Fig. 15. Fig. 21 is a detail view showing portions of the proportional divider lever system in relative position but detached. Fig. 22 is a detail view showing another portion of the proportional divider lever system for varying the leverage of one member relative to the other. Fig. 23 is a section on the line G—G, Fig. 15. Fig. 24 is a top, plan view of the justification signal selecting devices and their connections. Figs. 25 and 26 are detail views showing the interponents of the major and minor justification systems respectively together with the special interponents for leading and sectional justification. Fig. 27 is a rear elevation of the mechanism shown in Fig. 24. Fig. 28 is a detail of the devices for actuating the units-wheel escapement. Fig. 29 is a detail of the releasing devices for the escapement of the divisor mechanism. Fig. 30 is a detail, partly in section, of the means for converting proportionate measurements into units of the major and minor justification systems, together with the resetting cylinder and piston and connections. Fig. 31 is a detail of the connection for releasing the escapements of the divisor and line measuring systems. Fig. 32 is a detail view of the pawl and ratchet connection for measuring fractions of the major justification signals and setting the selecting devices of the minor system. Fig. 33 is a detail of the ratchet for dividing the proportional measurements into units of the major system. Fig. 34 is a transverse section on the line H—H, of Fig. 30. Fig. 35 is a detail showing the releasing devices for the pawls of the converting means of Fig. 30. Fig. 36 is a detail of the actuating mechanism for the em scale indicator. Fig. 37 is a longitudinal sectional view of the motor for the divisor element of the proportional divider lever system. Fig. 38 is a sectional view and Fig. 39 a side elevation of the escapement for the proportional divider element. Fig. 40 is a perspective view of the adjusting devices controlling the short and long line preventers. Fig. 41 is a detail of the connection between the actuating lever and the line measuring devices. Figs. 42 and 43 are rear elevations of the short and long line cut outs or preventers, shown in different positions. Fig. 44 is a side elevation of the control valve mechanism for the punch bar motor together with the automatic means for producing consecutive action of the major and minor justification signal devices and the resetting mechanism. Fig. 45 is a top plan view and Fig. 46 a reverse or right side view of the mechanism illustrated in Fig. 44. Fig. 47 is a perspective of the motor valve actuating devices detached from the supporting frame work. Fig. 48 is a front elevation of the devices shown in Fig. 44. Fig. 49 is a top plan view of the lower or dimensioning series of interponent bars, showing the arrangement of the lock out levers for long lines. Fig. 50 is a diagrammatic view of the keyboard illustrating special keys and their connections for actuating the justification mechanism, producing leading and sectional justification signals, and for repeating any signal or operating the feed hole punches without signals. Fig. 51 is a side elevation of the repeat trip and its actuator. Fig. 52 is a side elevation of the tripping devices for the valve mechanism of the actuator motor. Fig. 53 is a front view of the motor trip showing the connection with the repeat trip. Fig. 54 is a horizontal sectional view of the justification control valve on the line I—I, Fig. 56. Fig. 55 is a sectional view on the line J—J, Fig. 56.

Fig. 56 is a vertical section on the line K—K, Fig. 54. Fig. 57 is a similar view on line L—L, Fig. 54. Fig. 58 is a vertical section of the resetting or restoring valve. Fig. 59 is a top plan view of the consecutive action bar with its cylinder in section. Fig. 60 is a perspective of said consecutive action bar together with the justification designating pawls. Fig. 61 is a diagrammatic view showing the manner of connecting the several cylinders and valves of the pressure control system.

The same numerals designate like parts in the several figures.

The machine illustrated represents a preferred form of embodiment of the present invention adapted for use in connection with an existing record strip perforator, to wit, that of Patent No. 883,377, dated March 31, 1908, and inasmuch as the keyboard, punching, paper feed, motor and motor control mechanisms, together with part of the line measuring mechanism up to and including the units wheel are substantially identical with the corresponding parts in said application and are here included merely for illustrative purposes, it will suffice to designate the principal parts only, such as the series of punch-bars 1 with off-sets 2; the slotted actuator 3; the motor 4 with its controlling valve mechanism 5 and tripping latches 6; the three groups of punch selecting interponents 7, of which the lowest group represents the dimensioning elements of the various type signals, and the two upper groups the positioning elements; the keyboard 8 with its series of key bars 9, one for each key; the selecting translating devices 10 intermediate the upper group of interponents and the keybars; the permutation systems of translating devices 11 and 12 intermediate the keybars and the middle and lowest groups of interponents; the trip bar 13 common to all the keybars passing through the actuator 3 and acting upon the tripping latch 6; and the series of stop bars 14 each connected to one of the dimensioning punch bars and acting in conjunction with units rack 15 of the line measuring mechanism to admeasure the advance of units wheel 16 when the locking pawl 17 is withdrawn therefrom.

The units rack carrier 18 and the locking pawl 17 receive motion from cam sectors 19, 20, (Figs. 8, 28) pivotally supported upon the frame, sector 19 being coupled with the units rack carrier through a rod 21 and interposed compression spring 22, while sector 20 is connected by a link to an arm on the locking pawl. Cam sectors 19, 20, rest upon a hardened block 23 carried by a bell crank 24*, the latter coupled to a bar 25* parallel with the punch-bars and connected to actuator 3 (Fig. 2) in such manner that each time the latter is reciprocated block 23,

acting through cams 19 and 20, first raises the units rack 15 into engagement with the units-wheel, then raises the locking pawl 17 to release said units wheel and permit it to advance until arrested by a stop bar 14 and, on the reverse motion, reengages the locking pawl before the withdrawal of the units rack and the return of the latter to normal position.

Units-wheel 16 is provided with a hub 24, (Fig. 12) supported in bearings, and attached to a shaft 25, the latter connected through gears 26 with a shaft 27 carrying a pinion 28 for engagement with the motor rack 29, and a second pinion 30 engaging the line rack 31 carrying the pointer 32, the latter coöperating with line scale 33, to indicate length of line and the unoccupied space therein. Rack 29 is attached to two pistons, the one 34, working in motor cylinder 35 and the other 36 in the motor return cylinder 37. The advance movements of units wheel 16 and connected mechanism is effected through pressure in cylinder 35 and measured by the stop bars 14 successively brought into action, and the return of units wheel is brought about by opening the exhaust to cylinder 35 and admitting pressure in cylinder 37.

An adjustable line gage 33 is provided for setting the line rack for the length of line desired, the line scale being usually marked in divisions representing ems and half ems; but it is sometimes desirable, more especially in tabular work, where sectional justification of the lines is performed, as well as when setting the line gage, that smaller subdivisions of the em than can conveniently be read directly upon the line scale be indicated, hence a multiplying indicator is provided from which fractions of the em, can be read. For this purpose a pointer 39 working in conjunction with a dial 40 is mounted upon a shaft carrying a pinion 41 (Figs. 8 to 12) in engagement with the units wheel 16. As usually constructed the units wheel contains thirty six teeth each representing the eighteenth part of a pica em, and the pinion 41 nine teeth, so that the pointer will make a complete excursion around the dial for each half em, each division mark thus representing $1/9$ em. By means of this supplemental or multiplying indicator the operator is enabled to use non-justifying spaces or quads in filling out the line, as he can see at a glance how much space remains to be filled, measured in fractions of an em, and is thus enabled to select quads or spaces appropriate thereto.

With the exception of the em scale indicator, which is new in this connection, the mechanism thus described is typical of a well known class of record strip composing machines, the characteristic features whereof irrespective of the special form of em-

bodiment are, a means for producing consecutive character and space signals coupled with means for measuring the space value of each signal and the total value of all the signals entering into the composition of a line.

The new automatic justification signal selecting mechanism is in the nature of an auxiliary or addition to the composing machine, and among its other distinguishing features embodies a proportional divider system for measuring or gaging the amount to be added to each space in order to fill out or justify the line, and a justification signal selecting system in which the measure thus obtained is converted or translated into the unit of the justification system employed and the signal producing devices, such as a punch or punches, of corresponding space value brought into operative position. This feature is believed to be entirely novel, especially in the relation to a typographic composing machine of this character. In the example illustrated the line measuring mechanism, of which the units wheel may be taken as the index, in that the extent of its movement from zero position is proportionately equal to the aggregate space value of all the type signals of the line is utilized to control one element or portion of the proportional divider system, while the justifying space signal devices control another, to the end that the ascertained deficiency of the line may be accurately divided by the number of spaces contained in the line. The proportional divider in turn controls the justification signal selecting system, which latter operates to divide the maximum number of permissible justification units (in the example, fifteen) by the quotient of such division and to select that one of the justification signal producing devices or punches whose value, multiplied by the space type, will fill the line, it being the intent, in this instance, that the fraction thus designated and represented by the justification signal, shall, in the controlled machine, be added to the normal space value of each indicated space.

It may be well to note, in passing, that the unit of justification varies in different systems and may be represented by one or more justification signals in the record strip, and that in the preferred system illustrated provision is made for two distinct justification signals one for each of two adjusting mechanisms in the controlled machine, the major system embracing fifteen degrees or units of .0075 inch each, and the minor system a like number of degrees or units of .0005 inch each; in other words, the maximum range of justification, *i. e.*, addition, is .112 inch. multiplied by the number of justifying spaces in the line, the unit of justification being in this instance .0005 inch for pica.

It is of course understood that the dimensions of the unit as well as the number employed are subject to variation. The proportional divider system for gaging the amount required to be added to the spaces in order to justify or fill the line is best seen in Figs. 9, 15 to 23 inclusive and 27 and includes as its principal features adjustable transmitting device or sets gaging lever, for varying the line measure, and a variable space divider whose divisor element is controlled by the justifying space signal devices and its dividend element by the line measuring devices, the resultant or quotient of their united actions corresponding with and gaging the amount to be added to each justifying space type in order to absorb the deficiency.

To the frame are secured three parallel guides or ways 42, 43 and 44. The upper guide 42 comprises two parallel sets of ways for the reception of two slides 45 and 46. The central guide 43 is in two sections, composed of two parallel bars, each supporting a shoe 47, one for each section; and the lower guide 44, also in duplicate, supports shoes 48, the latter preferably united by a tie rod 49, to insure simultaneous and equal motion.

As will be observed by reference to Fig. 20, guide 42 occupies a central vertical position between the two members of the lowest guide 44, while the members of the central guide stand outside of the plane of guide 44.

It may here be remarked that the duplication of guides and levers in this part of the apparatus is merely for the purpose of resisting distortion and displacement, in the interests of greater accuracy and is not otherwise essential.

Supported at an angle to and in a plane intersecting those of the guides 42, 43, 44, is another fixed guide 50, also in duplicate, upon which traverse shoes or fulcrum blocks 51 and on opposite sides of this guide 50 and in parallel therewith are the duplicate members of the fulcrum bar 52, arranged for longitudinal adjustment, as by having one end supported in a guide 53 on the frame, and the opposite end secured to a block 54 taking its bearing on the frame and provided with a micrometer or equivalent adjusting device, such as screw 55 taking its bearing on the frame and engaging a nut 56 carried by the clamping bolt 57 on the block 54. To the slide 45 is pivotally connected one end of the sets gaging lever 58 mounted in ways on a fulcrum block 59, the latter pivotally attached to one member of the adjustable fulcrum bar 52. Lever 58 has its lower or weight end supported in ways in shoes 60, the latter pivotally connected through pins 62 to bearings 61 on shoes 48. The guides for slide 45 and shoes 48 being parallel the motion communicated

through the transmitting lever 58 will be proportional to the lengths of the two arms of said lever, which can be varied by the adjustment of fulcrum block 59 to increase or diminish the line measure in adapting the machine to different sets. To the slide 46 is pivoted one end of the variable space dividing lever 64, so called because through the medium of its shiftable fulcrum (divisor) the measured excursions of slide 45 or shoes 48 (corresponding with the deficiency of the line) as transmitted through said lever 64 to slide 46 are diminished in exact proportion to the number of justifying or variable spaces contained in the composed line. This lever 64 is composed of three parallel bars or members rigidly connected at corresponding ends. One of a pair of shoes 65 rides upon each of the outer bars of lever 64 and has attached to it one of the pivot pins 62 uniting shoes 60 and 48. The inner bar of lever 64 forms a guide for a shoe 66 bearing pivot pins 67, the latter engaging fulcrum blocks or shoes 51 on guide 50.

Pivotally attached to the frame is a head 68 carrying two pair of bars 69, 70, arranged in parallel planes on opposite sides of the pivotal point of attachment of said head. The inner and right hand pair of bars 69 control the position of the fulcrum of the variable space dividing lever 64 in a manner to vary the proportions of its two arms in accordance with the number of justifying spaces in the line, to which end said bars are coupled to the fulcrum by means of shoes 71 carrying pins 72 engaging bearings 73 in shoes 51 said bearings being located below the points of attachment of shoe 66. The outer and left hand bars 70 are each provided with a shoe 74 which is pivotally connected at 75 with the shoe or block 47 sliding on guides 43.

By reference to Figs. 15, 21 and 22, wherein the parts are shown in normal or inactive position, it will be seen that the pivots of slides 45, 46, blocks 59 and shoes 48, 51, 60, 65, 66 and 71 are located in a plane parallel with fixed guide 50, with pivots 62 and 67 in alinement; slides 45, 46 are in contact with abutments, such as those formed by adjusting screws 77; and the pivots of head 68 and shoes 71 and 74 are located in a plane intermediate and parallel with bars 69 and 70. This is the normal position when there are no space type in the line and no opportunity is afforded for an increase by justification, and any attempt to displace lever 58 would be prevented because the power transmitted from lever 58 through shoes 60, 48 and 65 to lever 64 is applied in line with the pivot of shoe 66 forming the fulcrum of lever 64. When, however, shoe 47 is advanced upon guide 43, as it is each time a justification signal is produced, it operates

through shoes 74, bars 70 and 69, and shoes 65 71, to shift shoes 51 lengthwise of the fixed guides 50, thereby placing the shiftable connection or fulcrum 67 of lever 64 to one side of the point of application of power through shoes 48 and 65 so that when the sets gaging lever 58 is swung on its pivot the motion communicated to the weight end of the variable space dividing lever 64 (slide 46) will be in proportion to the relative lengths of the two arms of said lever as determined by the position of the fulcrum 67.

The parts are so arranged and constructed that the variations of leverage effected by consecutive adjustments of fulcrum 67 will be such that for a given movement of shoe 48, slide 46 will be advanced its full stroke, (corresponding to the maximum addition to any space type) with the fulcrum in first position; $1/2$ stroke with fulcrum in second position; $1/3$ stroke with fulcrum in third position, and so on.

The adjustment of fulcrum shoe 51 varies and determines the relative length of the two arms of the variable space dividing lever or member 64 through which the line measuring devices act upon slide 46, whereas the adjustment of fulcrum block 59, by varying the proportions of the actuating members of the system, *i. e.* the sets gaging lever 58, changes the ratio of the space and line measurements. This latter capacity of the proportional divider system is of great value and importance inasmuch as it enlarges the capacity of the machine to deal with different sets and units of measurement.

The progressively variable motions required for adjusting fulcrum 67, so that the stroke of the weight end of lever 58 (pivot 62) will be divided at the weight end of lever 64 (slide 46) in the ratio desired, *i. e.* $1, 1/2, 1/3, 1/4$ &c may be produced by a variety of means, but that illustrated is preferred in that it enables successive movements of uniform extent, derived from the space signal mechanism, to be converted into variable movements of its desired degree.

In the illustration, wherein the parts are so proportioned that the maximum excursion of slides 45 and 46 is equal and the fulcrum 67 of the variable space dividing lever 64 is normally coincident with the point of application of sets gaging lever 58 to the transmitting shoe 48, the first advance of shoe 47 under the control of the escape-ment devices, Figs. 38 and 39, effects a comparatively slight displacement of fulcrum 67, just sufficient in extent to so proportion the two arms of lever 64 as that a predetermined fractional movement of slide 45 and shoe 48 will cause slide 46 to make a full excursion. This fractional movement of slide 45 corresponds with the maximum line

deficiency which can be absorbed by justification in a line containing a single space type.

Owing to the angular relation of rods 69—70 to guides 43, 50 each succeeding uniform advance of shoe 47 displaces fulcrum 67 in a less degree, the proportion being such that at the second stage of advance, corresponding to two space type, the same predetermined fractional movement of slide 45 will advance slide 46 but half the distance; at the third stage, corresponding to three spaces, $1/3$; at the fourth stage, $1/4$ and so on, each succeeding advance of shoe 47 varying both arms of lever 64 and diminishing the throw of the weight end.

It is obvious that if the measuring movement of slide 45 is restricted to the fractional amount indicated, *i. e.* to a degree of motion sufficient to effect a complete traverse of slide 46 when fulcrum 67 is one degree removed from pivot 62 of shoe 48, the capacity of the machine will be limited, in respect to the total amount of line deficiency which can be absorbed by justification, to the maximum degree applicable to a single space, whether this deficiency is applied to a single space or distributed among several spaces, owing to the fact that each space added to the line diminishes the throw of slide 46 in the proportion of extent of movement of slide 45 divided by the total number of spaces. To enlarge the capacity of the machine in this particular, slide 45 is permitted a degree of movement which is a multiple of the fractional motion alluded to, thereby increasing the area of justification to accord with the number of space type contained in the line. For example, if the maximum amount which can be added to a single space type for justification purposes is, say twelve units, it will be represented by a full traverse of slide 46 and corresponding fractional movement of slide 45, and if two or more spaces are registered the traverse of slide 46 will be correspondingly diminished, although the measured movement of slide 45 remains the same. Thus for two spaces slide 46 will be advanced half way, adding six of the twelve units to each space, and for three spaces it will make one-third of a traverse adding four units to each space and so on. In the first instance—two spaces—there is a capacity in the machine for the addition of six additional units to each space, and in the second instance—three spaces—a capacity for the addition of eight additional units, hence if in one case the range of movement of slide 45 is doubled and in the other increased three fold and so on in proportion to the number of spaces in the line, the capacity of the machine will be increased to such an extent that the maximum of twelve units can be added to as many

space type as the fractional traverse of slide 45 is contained in the total permissible movement of said slide. Thus the area of justification increases in proportion to the number of space type contained in a composed line, the shortest measure, represented by a single space type, corresponding with the fractional movement of shoe 48 required to effect a full stroke of slide 46. It will be noted that with this arrangement the movements of adjustment applied to slide 45 and to shoe 47 may be simultaneously or successively performed, as desired, but it is preferred to adjust 47 in advance of 45, and to cause the latter to measure the deficiency, rather than the occupied space in the line, to which end a special adjusting or positioning mechanism has been devised.

The details of the divisor adjusting mechanism for controlling the position of shoe 47 are best seen in Figs. 5, 6, 9, 29, 37, 38 and 39.

To the pivot 75 of each shoe 47 is coupled one arm of a yoke or frame 78, the latter adjustably attached to a rack bar 79 (Fig. 37) bearing a piston 80 working in a cylinder 81. Each end of the cylinder 81 is closed by a screw plug or head 82 grooved externally, as at 83, and provided with a ring 84 to form a pressure chamber or passage communicating with the interior of the cylinder. A shaft 86 mounted in bearings on the frame carries a pinion 87 in gear with rack bar 79, and is provided with an escapement device comprising a wheel 88, controlled by a pallet whose arms 89 are pivotally attached to a carrier 90. Each arm 89 is provided with an adjusting screw engaging a bearing on the carrier to which it is held by a spring 92, this construction being adopted in order that the distance between the engaging ends of the pallet may be adjusted and either arm moved out of engagement with the wheel 88 by the restoring mechanism to be described. The carrier 90 is fastened to a shaft 93 (Figs. 5 and 6) the latter coupled to the space signal producing devices,—punch bar 1—through suitable connections, such as those seen in Fig. 6, whereby each time a justification space signal is formed the pallet will be oscillated, to permit the passage of one tooth of the scape wheel and the shoe 47 will be advanced one degree by its motor.

By reference to Figs. 8, 10, 11, 12, 15 and 18, it will be seen that the adjusting or positioning mechanism about to be described, is connected to slide 45 and operates to shift the controlling member of the proportioned divider system when gaging the deficiency of the line. To slide 45 is adjustably attached a rack bar 94 supported in guides on the frame with its teeth meshing into a wheel 95 fast on a sleeve 96 surrounding the units wheel shaft 25. The rack 94 is coupled

with a motor, as by a shaft 97 provided with two pinions, one engaging said rack and the other a rack 98, the latter provided with pistons 99, 100 working in cylinders 101, 102, (Figs. 1, 9 and 61). On the end of sleeve 96 next the units wheel 16 is an arm or disk 103 carrying a stud or projection 104 (Figs. 11 and 12) and the units wheel is equipped with a similar projection 105.

Projection 104 which forms one terminal of the proportional divider system, is held normally out of the path of projection 105, as by lever 106 engaging sleeve 96, said lever serving to shift the sleeve and bring the projections into the same plane when the measurement is to be made and the motor is energized for that purpose. The shifting of the sleeve is performed after the type and space signals for the line have all been recorded and is, in the present instance, effected by the depression of a special justification key 300 whose bey bar, unconnected with the punch bar selecting systems, acts upon an arm 107 of sleeve 108 (Figs. 1 and 50) the latter coupled by an arm 109 and link 110 with said lever 106. Simultaneously with this shifting of gaging projection 104 pressure is admitted to cylinder 101 of the motor as will presently appear, and the slide 45 is thereby advanced until arrested by the contact of projection 104 with 105. When the line is thus closed, by pressure upon the justification key, the projection 105 on the units wheel is arrested at a point distant from its zero position at the extreme end of the line equal or proportional to the amount of unoccupied space in the line, and as the initial or zero position of projection 104 corresponds with the end of the line, the movement permitted projection 104 will be equal or proportional to the space to be filled by justification.

It will be remembered that the units wheel measures the total space occupied by the signals; that the justification area includes but a small fraction of the line; and that the measurement to be made by slide 45 and its connections lies within said fraction,—consequently, in adjusting the machine initially the units wheel is first advanced until the pointer on the line scale stands at zero, thus indicating the complete filling of the line, when, through the agency of the adjusting screw 77 contacting with slide 45, the latter, together with the disk carrying projection 104, are moved until said projection contacts with projection 105 on the units wheel.

As before remarked the machine is preferably adjusted to the unit of the pica em and it is adapted for any set having a like unit by the addition of certain units to the desired measure where, as is the custom of the trade, said measure is computed in pica ems. In order that this addition may be

readily made the wheel 95 (Figs. 12, 27 and 36) is provided with a pin 111 in position to engage an arm 112 on shaft 113, the latter provided with a pointer cooperating with a dial 114. This dial is marked in pica em units and the parts are so proportioned, arranged and adjusted that by means of screw 77 the units wheel may be set back beyond the zero point of the line scale, the desired number of units to correspond with the set.

The mechanism thus far described provides for the measurement of the space to be filled by justification and the division of the same by the total number of spaces contained in the line, resulting in a measured movement or displacement of slide 46,—the quotient element of the proportional divider system—proportioned to the justification fraction for the line, and it is next in order to explain how this movement or gaging is utilized in the selection of the justification dimensioning punch or punches corresponding thereto. This is accomplished through the agency of a translating system or mechanism by which the motion of slide 46 is converted into or measured in units of the major and minor justification systems and the appropriate signals are selected. The details of this mechanism will be found in Figs. 1, 4, 9, 10, 12, 24 to 27 and 30 to 35 inclusive.

As before stated the system with which the preferred form of apparatus illustrated is specially designed to work is one employing two sets of justification signals, one for the .0075 unit and the other for the .0005 unit. Each justification signal includes a designating element or perforation and a dimensioning element or perforation, the one serving to designate the adjusting mechanism to which the degree of adjustment indicated by the other is to be applied. The justification signal selecting system includes special punch bars 115, 116, Fig. 4, representing the justification designating signals and the punch bars of the intermediate group of interponents 7 the latter being utilized for the dimensioning elements, each representing one of fourteen successive degrees of movement of the centering mechanism in the casting machine, the fifteenth degree being represented by a fixed stop and the omission of a dimensioning perforation. Each punch bar of the intermediate group of interponents 7 is provided with two additional off-sets 118, the latter disposed in parallel lines transversely of the punch-bars, while punch bar 115 has a single off-set 117 in line with the upper series, and punch bar 116 has two off-sets 117, one in each row. These off-sets 118 lie within slots 119 in a supplemental actuator or plate 120, see Figs. 4, 10 and 12—the latter connected to reciprocate in unison with primary actuator 3 by bars 121, provided with shoulders engaging both of

said actuators. These bars 121 also carry punches by which the feeding perforations along the edges of the strip are produced, to which end the off-sets which engage actuator 3 are of the width of the slot therein and are not provided with interponents, consequently their punches are operated each time actuator 3 reciprocates.

Opposite each row of off-sets 117, 118, are two sets or pairs of interponents 122, 123 and 124, 125, adapted to be interposed between said offsets and the actuator 120. The interponents of each pair are pivotally coupled at one end to a rod 126 or 127 supported on arms 128 or 129, respectively, the latter pivotally attached to the frame so that motion may be transmitted to each pair of interponents in a direction to cause them to enter or withdraw from the slot in the actuator. One interponent 122, 124, of each pair is supported in fixed guides and arranged to cooperate with the off-set of its justification designating punch bar 115, or 116, while the other interponent 123, 125, is adapted to be shifted laterally of the punch bars, to which end it is supported between guides 130 or 131 on a carriage 132 or 133, the latter traversing upon guides 134 or 135 so that the interponent can be brought opposite any one of the punch bars in position to enter between its offset 118 and the actuator 120. The rods 126, 127, are each coupled by a link 136 to one of two levers 137, 138, by which they are actuated in a direction to advance and retract the interponents attached thereto, and each carriage 132, 133, is attached to one of two rack bars 139, 140 through which lateral motion is communicated to its interponent 123 or 125. Springs 141 serve to hold rack bars 139—140 normally retracted with their respective interponents 123—125 opposite the punch-bars representing the minimum justification values *i. e.*, .0075 and .0005, respectively.

The selection of the interponents corresponding in value to the indicated position of gaging slide 46 is effected through the shifting of interponents 123, 125, interponent 123 being permitted a range of adjustment or lateral movement extending one degree beyond the last or fourteenth off-set of the series of punch bars, the latter being of uniform width and equally spaced. In order to utilize the position of slide 46 for this purpose it is required that the movement of adjustment shall be in some way divided into equal periods, representing the unit of justification, in order that the selecting interponents may be shifted directly and completely from one active position to the next, and thus prevent an overlapping of the signals, and further, where double justification signals are employed, the movement of slide 46 in excess of the major signal unit or a multiple thereof should be represented by

or converted into a fractional movement expressed in terms of the unit of the minor signal. To accomplish this is the purpose of the translating system referred to whereby the traverse of the slide 46 is measured and indicated in units of the major system and the excess or fraction, if any, is measured in units of the minor system. With these ends in view the carriage 133 of interponent 125 pertaining to the major designating interponent 124 is coupled to slide 46 through rack 142, wheels 143 and 144, shaft 145 and pinion 146, engaging rack bar 139, whereby the motion communicated to interponent 125 will be proportional to that of slide 46.

The rack bar 140 connected to carriage 132 of the minor system engages a wheel 147 fixed to a shaft 148, one end supported in a bearing on the frame and the other in the head 149 of a cylinder 150 (Fig. 30). Loosely supported upon shaft 148 is a sleeve or collar 151 carrying a pinion 152 in mesh with wheel 144 and partaking of the motion thereof as derived from slide 46. The head 149 is provided with a ratchet disk 153 whose teeth are spaced to accurately accord with the distance between centers of the off-sets 118 on the punch bars as magnified by the transmitting gearing, and adjacent said disk and fast on shaft 148 is a ratchet wheel 154 the number of whose teeth, as compared with those of disk 153, are as fifteen to one. Sleeve 151 carries two pawls of which one, 155, engages disk 153, while the other, 156, operates upon ratchet wheel 154.

During the advance or adjusting movement of slide 46 the pawls 155, 156, ride freely on the ratchet teeth, and carriage 133 is alone shifted. If the movement is exactly divisible by the unit of the major system, *i. e.*, .0075, pawl 155 will fall behind a tooth on disk 153 and interponent 125 will be held opposite the punch bar corresponding to the number of units covered by such advance of slide 46. At the same time pawl 156 will engage the first of the series of fifteen teeth on ratchet wheel 154, and its interponent 123 will remain in initial position. But if the movement imparted by slide 46 is in excess of one of the divisions of the major scale or a multiple thereof, pawl 155 will be carried beyond the tooth of disk 153 a distance proportional to such excess, and, at the same time, pawl 156 will be carried a like distance beyond the first tooth of the corresponding series on ratchet wheel 154, so that when slide 46 reaches the end of its traverse, the fraction of the unit on the major scale will be represented by the distance at which pawl 155 is carried beyond the tooth of disk 153, and this distance will be measured in units of the minor scale (in the present instance .0005 inch) by the engagement of pawl 156 with that one of the series of teeth on ratchet

wheel 154 whose position corresponds to the degree of departure of pawl 155. To render these adjustments effective, immediately slide 46 has been advanced to position and has thus gaged the deficiency of the line, its motion is reversed and pawl 155 retracted until it engages and is arrested by the tooth of disk 153, thus bringing interponent 125 into alinement with the selected punch bar. During this retrograde movement, pawl 156, through its engagement with ratchet wheel 154, communicates its motion through shaft 148, wheel 147, rack 140 and carriage 132 to interponent 123, thus moving said interponent the width of as many punch bars in the series as there were teeth in ratchet wheel 156, in the space covered by said retrograde movement of pawl 155. The reverse or retrograde movement mentioned is produced through the agency of pressure admitted to cylinder 102 of the adjusting or positioning mechanism, as hereinafter described.

In addition to the interponents mentioned three auxiliary interponents, 157, 158, and 159, controlled from special keys are introduced in connection with the justification interponents, for producing leading and sectional line justification signals according to Patents Nos. 700,288 and 700,330. The leading signal is composed of a selected perforation used in conjunction with designating perforations of the justification signals; while the line closing signal for sectional justification requires the concurrence of both justification designating perforations in the same signal. Interponents 157 and 158 relate to leading. Each is located opposite a punch bar of the group controlled by the upper series of interponents 7 indicating position, said bar being provided with an offset 160 (Fig. 4) in line with each series of off-sets 118 and received within the slots in supplemental actuator 120. Each of said interponents 157, 158 is supported at one end upon one of two links 161 below one of the rods 126, 127, the opposite ends of each of said links being connected to an arm of one of two bell crank levers 162, the other arm whereof is in position to be acted upon by the keybar of its leading key 301 or 302 as indicated diagrammatically in Fig. 50. Each interponent 157, 158, is also provided with a notch 163, that in 157 being opposite rod 126, and that in 158 opposite rod 127, so that when either of the leader keys is operated in conjunction with the resetting key 300, the interponent 157 or 158 will be elevated and coupled with the rod 126 or 127 in such manner as to cause it to be advanced and thus bring its punch into action, at the same time the justification signal selecting devices connected to said rod 126 or 127 are coupled with the actuator. The interponent 159 pertaining to the line closing signal for sectional justification, is arranged to be

brought into action simultaneously with the designating interponent 122 of the minor justification system, to actuate the punch bar 116 representing the designating element of the major justification system, so that the two designating perforations will be formed at the same time. To this end said interponent 159 is located opposite the upper offset 117 on punch bar 116 and is supported at one end upon a link 164, the latter connected to a bell crank 165 whose other arm is in position to be engaged by the key bar of the sectional justification key 303, Fig. 50. This interponent is also supplied with a notch 166 to receive rod 126 by which it is advanced in unison with interponent 122.

It is to be remembered that according to the present embodiment the selection of the justification signals is postponed until all the type and space signals for the line have been formed and the line measuring devices have entered the justification area. It is important, therefore, that composition should not be extended beyond the justification area nor interrupted before the latter is reached, as this would result in lines varying from the standard and beyond the capacity of the machine to correct by justification, hence it is desirable that competent means be provided for preventing the accidental composition of long or short lines, inasmuch as either of these will automatically arrest the controlled machine, such as the type casting machine, resulting in loss of time and producing incapacity. To guard against this defective use of the composing machine means are provided whereby the starting of the justification mechanism into action is automatically prevented until the composition of the line has entered the justification area, so that the line can be filled out by justification, and whereby, after the justification area has been reached, the capacity of the apparatus to form type or space signals is restricted to such as represent a space value not in excess of the deficiency at the time existing in the line. The details of this short line preventer mechanism are to be found in Figs. 1, 12, 13, 24, 27, 28, and 40 to 43 inclusive.

Supported in ways on a guide bar 167 fixed to the frame is a rack 168 whose teeth engage a pinion 169 (Figs. 12 and 13) the latter supported in bearings in rear of and having its axis coincident with the shaft 25 of the units wheel. The hub 24 of the units wheel is provided with a shouldered disk 170 (Fig. 13) adapted to receive the engaging end of a pawl 171 pivoted upon pinion 169. The pawl 171 is furnished with a spring tending to effect engagement with disk 170, and a pin 172 on the frame is so located that when the rack 168 is in its retracted position (Fig. 13) it will engage the tail of the pawl 171 and raise it from contact with disk 170. The disk, pawl and pin

arrangement constitute a pick-up which is preferably employed in place of a constant connection in order to shorten the traverse of the rack bar 168, as the latter is operative upon the cut-out devices only during the formation of the last portion of the line, to which end the pin 172 is so located that pawl 171 will drop behind the shoulder of disk 170 immediately the rack 168 is advanced, so as to withdraw the pawl from engagement with said pin 172, and thereafter the rack will follow the movements of the units-wheel as the latter measures off the line. Rack 168 is provided with a motor device in the form of a piston 173 working in a cylinder 174 and provided with a retracting spring as indicated in Figs. 42 and 61. Pressure is admitted to cylinder 174 at a predetermined point in the movement of the line measuring mechanism and operates in a manner to supplement the action of the motor which drives the units-wheel.

Guided upon bar 167 is a slide 178 carrying a pivoted guide block 179 in which works one end of a lever 180, the latter pivotally supported upon one arm of a lever 181. The other arm of this lever extends transversely of the justification starting bar 182 and normally engages a notch or shoulder thereon so as to prevent movement in a direction to start the justification mechanism.

For a purpose to be hereinafter explained the slide 178 carries an extension 183 occupying the groove in bar 167 against which the end of rack 168 abuts as the line measuring devices approach the justification area.

The pivot of lever 181 is intermediate the points of attachment of lever 180 to the former and to block 179, and in an arm 184 on said lever 180 is formed a radial guide for the reception of a pivoted bearing block 185 carried by a slide 186 mounted to reciprocate longitudinally of a fixed bar 187.

To slide 186 is connected a spring 188 and a gage bar 189 the latter provided with an adjustable gage 190 for limiting the movement of the slide under the pressure of its spring, said gage bar being arranged to contact with the yoke or frame 78 of the divisor or space counting devices.

The purpose and operation of the mechanism thus far described is to hold the starting lever 182 in lock while the signals for the line are being formed and until the justification area has been reached.

When starting a line of composition and until a justifying space signal is formed, slide 178 is held to one extreme position against the pressure of spring 188 by the engagement of gage-bar 189 with yoke 78 as in Fig. 43. In this position lever 181 is in engagement with the starting bar 182 and the latter is locked out of action. As the composition of the line proceeds and as it nears the end, the motor for rack 168 is

energized and the latter is advanced proportionally with the units-wheel until it engages extension 183. A further movement tilts lever 180 on its connection with slide 186, as a pivot, and through its engagement with lever 181 raises the latter from engagement with the starting bar 182. This release or unlocking of the justification and line closing mechanism preferably takes place immediately the composition enters the justification area, when the deficiency can be supplied by justification; but as the justification area is a variable quantity, depending upon the number of justifying spaces contained in the line, provision is made for varying the point of release to correspond with the number of justifying spaces occurring in the line. This is accomplished by the gage bar 189 contacting with the yoke 78 and serving to advance slide 186 each time the signal for a justifying space is formed, thereby advancing lever 180 toward rack 168 a distance proportional to the number of justifying spaces in the line and correspondingly anticipating the time at which the rack bar 168 will operate through lever 180 to unlock the starting bar.

For practical reasons it is not desirable that an unlimited extension of the justification area should be permitted, consequently a limiting device, in the form of gage 190 is provided, to compel a more complete filling of the line before applying the justification signals. This gage is set to arrest slide 186 after a predetermined number of space signals have been formed, so that no further extension of the justification area will thereafter occur and the composition of the line will have to be proceeded with until the area thus established has been entered.

To prevent overrunning, that is, the formation of type signals, in excess of the line, a variable lock out is provided the same being preferably applied to the key board in connection with the dimensioning elements of the punch bar selecting mechanism represented by the lower group of interponents 7, the rack bar 168 serving as the controlling or readjusting agent therefor. This lock out or long line preventer might be applied directly to the interponents, but, in order to economize space, the motion of each interponent is transmitted to one of a series of levers 191 (Figs. 1, 8 and 49) pivotally supported in a detachable frame 192, the latter carrying a corresponding series of locking devices, such as latches 193, each provided with a shoulder 194 adapted to be interposed in the path of its lever, to prevent movement of the same and of the interponents coupled therewith.

Latches 193 are normally supported out of the paths of their levers 191 by a gage block 194* (Figs. 1, 4 and 43) movable in ways transversely of the latches, and connected

by a link 195 to a lever 196, the latter provided with a retracting spring and engaging a shoulder 197 on a block 198 sliding upon guide bar 167, in line with the line measuring rack bar 168. Gage block 194^{*} stands normally beneath and supports the latches 193 (Fig. 43) so that they will not interfere with the key action; but as the end of the line is approached rack bar 168 engages block 198, and, through the lever and link connections, communicates its motion to the gage block 194^{*}, whereby the latches 193 are successively released. The parts are so adjusted that rack-bar 168 will contact with block 198, or the latter with its lever, when the space remaining to be filled is exactly equal to the width of the largest type of the set, say eighteen units for pica and the transmitting devices are so proportioned that the motion communicated to the gage block 194^{*} will bear the same relation to the width of the series of latches as that of the rack-bar to the units wheel. The motion of the gage block is in a direction to first uncover or release the latch pertaining to the dimensioning interponent of highest value, and the others in succession according to value, so that at the instant of contact between rack bar 168 and block 198 any signal may be formed as the space remaining will just accommodate the largest type; but in proportion as this reserve is encroached upon all the signal producing devices representing values in excess of the unfilled portion will be cut out or prevented from operating by reason of the engagement of the latches, so that only those signals which can be accommodated within the line are available, and if the latter are not desired, the line is closed by the justifying mechanism. Suitable means, such as screw 199 forming a back stop for lever 196 is provided for adjusting the initial position of block 198, to accord with the set of the font.

Having explained how the space to be filled by justification is measured and apportioned, by division, among the spaces and the selecting devices of the justification signal mechanism adjusted to accord therewith, it remains to be seen how the justification signals are produced and the parts reset for the next line.

Inasmuch as in the preferred embodiment illustrated the resetting is automatically performed after the justification signals have been produced, its principal actuating devices will first be described, in order that its relation to the other mechanisms may be understood.

It is necessary for the restoration of the parts to initial position that the various holding devices, such as locking pawl 17 of the line measuring mechanism, the pallet arm 89 of the divisor adjusting mechanism and pawls 155 and 156 of the justifi-

cation selecting or translating mechanism, should be acted upon, to release or permit retrograde movements of the parts held thereby. The release of these parts is inaugurated by a piston 200 in cylinder 150 (Figs. 24, 27 and 30).

Guided to reciprocate upon the front end of cylinder 150 is a sleeve 201 which is attached to the piston by screws or pins 202 extending through lateral openings in the cylinder. A retracting spring 203 is applied to the piston and the sleeve is formed or provided with a conical head 204 adapted to engage pins 205 on pawls 155, 156, the arrangement being such that when pressure is admitted to the cylinder, head 204 will be thrust forward to engage pins 205, thus raising pawls 155, 156, from engagement with disk 153 and ratchet wheel 154 and abandoning the shifting mechanisms of interponents 123, 125 to the action of their retracting springs and the movement of rack bar 142 and its connections to pistons 99, 100. One of the screws 202 engages an incline 206 (Fig. 31) on lever 207 pivoted on the frame (Fig. 27) and to said lever is connected a link 208 whose lower end is coupled to a lever 209 (Fig. 29). The opposite or free end of this lever 209 stands immediately below the holding arm 89 (Fig. 39) of the pallet so that when rocked it will disengage the pallet from the escapement wheel and abandon the space counting mechanism to the control of piston 80.

To link 208 is pivotally connected one end of a lever 210 projecting (Fig. 27) beneath the rocking frame carrying locking pawl 17, in position to engage an adjusting screw 211 thereon (Fig. 28) for raising said pawl out of engagement with the units-wheel, thus abandoning the latter and connected mechanism to the control of the motor return cylinder.

Passing now to the automatic action or mechanism for effecting justification and the resetting of the apparatus it is to be noted that this action is controlled by a special or justification key 300 (Fig. 50) whose key bar engages arm 107 through which the automatic justification signal selecting system is brought into operative relation with the line measuring mechanism. This arm 107 contacts with a bell crank lever 212 (Figs. 1, 9, 10, 28 and 50) connected to the starting bar 182, which latter, as hereinbefore explained, cannot be actuated until released by the short line preventer, and as the main valve mechanism 5, although not specifically claimed herein, is involved in said action, a brief mention of its mode of operation may be of assistance.

Referring more particularly to Figs. 1, 46 and 47, it will be seen that each time a type signal is formed trip bar 13 is advanced to release the latch 6 adjacent there-

to, whereupon spring 213 advances arm 214 and shifts valve rod 215 to admit pressure to the actuator motor 4. As the actuator rises lever 216 connected thereto and operating through link 217 effects reengagement of the latch 6 previously released, to restore spring 213, and then trips the opposite latch 6, so that arm 218 will engage valve rod 215 and return valve, thus cutting off pressure in the motor and opening exhaust. During the descent of the actuator the latch last released is reengaged through the medium of lever 216 and bar 217 and thus the initial conditions are reestablished. These operations are repeated during the formation of each type signal at which time the marginal or feeding perforations are produced, if desired, providing punch-bars 121 are equipped with punches, otherwise not.

By the manipulation of the line closing or justification key 300 not only is the proportional divider system or mechanism placed in coöperative relation to the line measuring devices, but a sequence of operations is inaugurated whereby the space gaging devices—slide 46 and connections—are first advanced and then retracted, to adjust the justification signal selecting mechanism—interponents 123, 125; the designating and selected dimensioning punches of the two justification systems are consecutively brought into action; and, finally, the resetting of the apparatus, preparatory to the composition of a new line is automatically performed without other or further attention on the part of the operator.

It will be more convenient to first describe the consecutive controller mechanism for actuating the justification punches and the resetting mechanism consecutively, reference being had to Figs. 1, 44, 45, 48, 53, 58, 59 and 60. Supported upon a pivot 219 in the frame of the valve mechanism 5, in position to engage pin 225 on trip 6, are two links or levers 220, 221, each carrying one of two pawls 222, 223. The tails of these pawls stand opposite a slot in the actuator 3, and they are held removed from but in position to be advanced into engagement with the actuator by retracting spring or springs 224. The actuating lever 137 for the interponents of the minor justification system extends down in front of the link 220 carrying pawl 222, while the actuating lever 138 of the major justification system terminates opposite link 221 carrying pawl 223. The points of the pawls ride upon a bar 226 attached to a piston 227 working in a cylinder 228, said bar being guided to reciprocate longitudinally and provided with two sets of ratchet teeth or detents on opposite edges. The lower set comprises two teeth 229 spaced laterally of the plate to bring one in line with each pawl 222, 223, said teeth being located at different points in the direction

of movement of said bar, so that when pawl 223 is in engagement with the first tooth, pawl 222 will rest upon the surface of the bar in position to be engaged by its tooth when the bar is advanced. The upper set comprises a series of three teeth 230 adapted to receive a pawl 231 pivotally supported upon the frame with its tail constantly in engagement with the actuator 3. The arrangement is such that upon the admission of pressure into cylinder 228 to advance bar 226, pawl 223, by virtue of its engagement with the tooth on said bar, will be forced forward into the slot in actuator 3 and at the same time the supporting link 221 acting upon lever 138 and latch 6 will advance the interponents carried by rod 126 and start the motor in action.

As the actuator 3 ascends pawl 231 is moved by it into engagement with the first of the series of teeth 230 to hold bar 226, and pawl 223 is withdrawn and permitted to return to initial position. The advance of bar 226 has now brought the second lower tooth into engagement with pawl 222, so that when the actuator 3 descends, after the major justification signals have been formed, and withdraws the holding pawl 231, bar 226 will again advance, this time carrying pawl 222 and its link 220 and moving actuator lever 137 so as to bring the interponents of the minor justification system into operative position, engage the tail of pawl 222 with actuator 3, and again operate latch 6 of the motor controlling valve. During this movement pawl 231 engages the second tooth and pawl 222 is released and retracted, so that upon the next descent of the actuator 3 a third advance of bar 226 will take place, but this time without effect upon the trip 6. On this last advance of bar 226 a shoulder 232 engages one arm of a lever 233, the other arm of the latter operating upon a stem or rod 234 to shift a controller for the resetting mechanism such as valve 235 (Fig. 58) contained in valve chamber 236. This valve chamber is connected with the pressure supply through pipe 237 and it contains three ports 238, 239, and 240, controlled by the valve 235. Port 238 (Fig. 61) communicates with the motor cylinder 35 of the line measuring mechanism and with one end of cylinder 81 of the divisor adjusting mechanism; port 239 communicates with the motor return cylinder 37 and the opposite end of cylinder 81; while port 240 opens to the atmosphere.

During the formation of type signals valve 235 is held by pressure in the valve chest or otherwise, so as to uncover port 238 and place port 239 in communication with exhaust port 240, thus providing for the advance movements of line measuring and line gaging devices. When, however, lever 233 is operated as described, the valve

is shifted to admit pressure through 239 and exhaust through 238, thereby reversing the action of the motors and returning the line measuring and line gaging mechanisms and when the pressure of lever 233 is removed the valve will again be shifted and the parts restored to initial position. This restoration to starting position involves a lifting of the latches 193 and of pawls 155 and 156 to effect which a cross head 241 (Figs. 1 and 43) spanning the series of latches is connected to a piston 242 below the latches, said piston working in a cylinder 243 communicating with port 239, as does the cylinder of piston 150, so that when pressure is admitted to the motor return cylinder, cross head 241 will be advanced to elevate latches 193 and permit the return of the gage block, and pawls 155, 156 and pallet 89 will be raised, to permit the return of the justification interponents and of the space gaging mechanism.

It may not be amiss to mention at this point that pressure is admitted to the motor 173 for rack 168 through a port 244 in motor cylinder 35, said port being uncovered by the piston as the latter approaches the end of the line within a distance slightly less, proportionally, than the traverse corresponding to one complete rotation of the units wheel.

Having explained the consecutive controller mechanism for bringing the automatically selected justification punches and the resetting mechanism into action, it is next in order to describe the operations of the line closing control system whose action is inaugurated by the starting bar 182. It will be remembered that the proportional divider system is brought into operative relation with the line measuring mechanism by the movement of starting bar 182, and that the operations to be performed by said control system are to advance the proportional divider mechanism and preliminarily adjust the justification signal selecting mechanism; to partially retract said signal selecting mechanism and thus designate the appropriate justification punches; to actuate the consecutive controller mechanism and to reset the mechanisms after their retaining devices have been released. A controlling system competent to perform these various movements in the order required is shown in the drawings, the details thereof being best seen in Figs. 1, 5, 7, 10, 54 to 57 inclusive and 61. Between the uprights of the paper tower in rear of the punch bars is located a frame or casing containing the valves and pistons of this control system.

Within chamber 244* in open communication with a pressure supply through a conduit 305 is located a slide valve 245 controlling exhaust and supply ports 246, 247, said supply port communicating with a second

chamber 248 containing a slide valve 249 arranged to cooperate with three ports 250, 251, and 253, of which the two first are supply and the last exhaust. Port 250 communicates with cylinder 101 of the variable space dividing motor and port 251 with cylinder 102, and when in their normal or initial positions, valve 245 covers ports 246 and 247, thus excluding pressure from chamber 248 and opening the latter to the atmosphere through port 246 while valve 249 covers ports 250, 252, thus opening cylinder 101 to exhaust, and leaving port 251 uncovered.

Beneath chamber 244* is a chamber 253 containing a differential piston valve comprising a stem 254 extending outside the chamber, and provided within the latter with a piston 255, a spring 256 and a reduced point or valve 257. This valve 257 seats against a relatively small port 258. At the inner end of the chamber and communicating with the passage leading to port 247 and in rear of piston 255, in position to be uncovered thereby when retracted is a port 258 communicating with cylinder 228 of the consecutive punching bar 226. Beneath chamber 248 is arranged an auxiliary motor consisting of a chamber 259 provided with a piston 260 whose stem is surrounded by a retracting spring and projected beyond the casing. Another chamber 261 contains a piston 262 with its stem projecting through the rear wall of the casing. The inner end of chamber 259 is in open communication with supply port 250 while that of chamber 261 connects with supply port 251 both of said ports being controlled by valve 249.

The stem 254 of the differential piston valve 255, 257, passes loosely through a bar 263 fast on the stem of piston 262, and is provided with an adjustable collar 264 against which said bar impinges when piston 262 is advanced.

Valve 245 is coupled to a rod 265 projecting through the casing, and valve 249 is provided with a similar rod 266 to the outer end of which is pivoted a latch 267 with its tail in line with the stem of piston 260.

Opposite the head of latch 267 and the end of valve rod 265 is a cross head 268 provided with an off-set or ledge 269 to receive and support the head of said latch. Cross head 268 constitutes the starter for the control mechanism and is connected to the starting bar 182, by coupling the latter to an arm of the pivot shaft 270 (Fig. 7) on which said cross head is supported. The operation of this part of the mechanism is as follows:—When cross head 268 is advanced, valves 245 and 249 are shifted, thereby admitting pressure to chamber 248. Port 250 having been uncovered pressure enters cylinder 101 to effect the advance movement of shoes 45, 46, forming parts of the line and

space gaging mechanisms. At the same time pressure is applied to piston 260 and the latter advancing hits the tail of latch 267 and disconnects the latter from cross head 268, whereupon valve 249 is returned to initial position by pressure upon its stem or rod 266 thereby opening the exhaust to cylinder 101 and admitting pressure to cylinder 102. This reverses the motion of the space gaging devices, to set the translating devices of the justification signal selecting mechanism.

The opening of port 247 admitted pressure to valve 257, but, owing to the relatively small surface area exposed, said valve remains seated until valve 249 retracts, as described, thereby admitting pressure to piston 262, and as the latter is forced back its bar 263 contacting with the collar on the stem of piston 255 moves the latter to unseat valve 257 and thus admit pressure in chamber 253.

Owing to the greater area of piston 255 as compared with valve 257, aided by the pressure on piston 262, said piston 255 is advanced to uncover port 258 thus admitting pressure to cylinder 228 of the consecutive punching bar 226. This condition is preserved by continued pressure upon the justification key until the punching operations have been performed, the line measuring mechanism returned, and pawls 155, 156, raised, whereupon the pressure continuing in cylinder 102, shoes 45, 46, are retracted, and the cycle of operations is completed when the justification key is released to return valve 245 to initial position.

It is obvious that if either of the special keys 301, 302, 303, Fig. 50 be depressed in conjunction with the justification or line closing key 300, the interponents 157, 158 and 159, corresponding therewith will be moved into operative relation with the actuating devices of the justification interponents, and the punch bars thus designated will be actuated in connection with those of the justification system with which they are associated.

When the marginal feeding perforations are formed in the same machine and in conjunction with the type signals, as herein contemplated, it is both desirable and important that provision should be made whereby said feeding perforations may be produced independently of the type or other signals, as, for example, in advance of and subsequent to the composed matter, to facilitate the insertion and withdrawal of the record strip in the paper feed of the casting or other controlled machine, and in order that this may be accomplished with facility, a special trip device or mechanism is connected with the actuator in such manner that when coupled therewith its action becomes automatic and continuous so long as the connection is maintained. The mechanism for this purpose,

termed the automatic repeat, includes a special key 304 (Fig. 50) whose key bar controls an interponent 271 (Figs. 1, 44, 45, 46 and 51) whose operating end passes through an opening in the actuator 3 and is provided with an incline or shoulder 272 in position to engage an auxiliary latch 273. This latch is furnished with a retracting spring 274 and a shoulder 275 the latter in position to engage the pin 225 carried by latch 6 of the controlling valve mechanism 5.

When key 304 is depressed its interponent is thrust forward into engagement with latch 273 as seen in Fig. 51, in consequence of which latch 6 is swung clear and the motor control devices are started in action the same as though the release was occasioned by the regular tripping interponent.

It will be observed that interponent 271 engages the upper wall of the opening in the actuator and is interposed between the latter and latch 273, consequently as the actuator ascends pressure upon latch 273 is relieved, permitting the reengagement of latch 6 as before. If pressure on key 304 is immediately withdrawn, a single reciprocation of the actuator will take place, producing perforations for a single feed movement; but if pressure is maintained upon said key, to retain interponent 271 in its advanced position, actuator 3, as it descends, will cause the latch 273 to be again swung into contact with latch 6 releasing the latter and inaugurating a second punching operation. This action will continue, automatically, so long as the repeat key remains depressed.

The repeat mechanism can be used effectively either alone or in conjunction with any character or type key, to repeat the designated signal.

Although these several improvements claimed herein have been shown and described in but one, the preferred, form of embodiment, it is to be understood that the invention is not limited thereto but may be utilized in various forms the equivalents in principle and effect of the mechanisms shown, hence within the scope of the appended claims.

Although in the present embodiment a separate series of dimensioning punches is employed in the manner and for the purpose explained in Patent No. 883,377, this is by no means essential, as the dimensioning of the mold may be performed by the punches of one of the positioning series, as in Patent No. 625,998, in which event the stop bars 14 will be coupled with the positioning series performing the dimensioning function; and when, as in this case, the separate series of dimensioning punches is employed to produce type signals for use in connection with a machine equipped with a separate dimensioning mechanism as in Patent No. 770,253, while one of the positioning series of punches is employed to produce the dimensioning ele-

ments of the justification signals, said separate dimensioning mechanism in the casting machine is coupled with and controls the normal wedge only, instead of both the normal wedge and the justifying wedges, the actuating devices for the latter retaining their connection with the die case positioning mechanism, so that the normal wedge will respond to the dimensioning components (perforations) of the type signals, and the justification wedges to one set of positioning perforations forming components of both type and justification signals, it being remembered that the justification signal when in action cuts out the pump thereby distinguishing the action of said positioning perforations occurring in the justification signals from the same perforations when forming components of the type signals.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent, is:—

1. In a composing machine such as described, the combination with means for producing type signals and line measuring mechanism controlled thereby, of a proportional divider provided with a primary or line gaging member the extent of whose movement is determined by the line measuring mechanism, and means for advancing said line gaging member after the signals for the line have been formed, to measure the deficiency of the line.

2. In a typographic composing machine the combination with character selecting, line measuring and resetting devices, of means for locking the character selecting devices out of action when the line measure has been filled, to prevent long lines.

3. The combination with a record strip composing machine of a long line preventer controlled from the line measuring devices and operating to lock out of action those character signal devices whose space value exceeds the unoccupied space remaining in the line.

4. The combination with a record strip composing machine of means for automatically preventing the formation of signals having a space value in excess of the line measure and means for preventing the closing of the line before the matter composed has reached the justification area.

5. In an automatic justification signal selecting mechanism for a record strip composing machine and in combination with the latter a proportional divider system for gaging the deficiency of the justification spaces contained in the line and means for varying the relation of the proportional divider system to the line measuring mechanism, to accommodate different fonts.

6. The combination with a record strip composing machine and a proportional divider system, of an adjustable sets gaging

member intermediate said proportional divider system and the line measuring devices.

7. The combination with a record strip composing machine and a proportional divider system for gaging the deficiency of the justification spaces in the line, of a sets gaging lever intermediate the proportional divider and the line measuring devices provided with an adjustable fulcrum for varying the relative proportions of its arms.

8. In a record strip composing machine the combination with the line measuring mechanism of a multiplying indicator device denoting fractions of the unit.

9. In a record strip composing machine, the combination with its line measuring mechanism, provided with a movable abutment or gaging member, of a proportional divider system provided with a gaging member normally in zero position and remote from the path of motion of the first mentioned gaging member, and means for moving one of said gaging members into the path of the other and for advancing it, to actuate the proportional divider and measure the interval between said gaging members.

10. In a record strip composing machine, the combination with the line measuring mechanism provided with a gaging member of the following elements, to wit; a line gaging member movable from its zero position, corresponding with the end of the line, into contact with the gaging member of the line measuring mechanism, to measure the deficiency of the line; and an adjustable sets gaging device coupled with said line gaging member.

11. In a record strip composing machine the combination of the following elements, to wit; a line measuring mechanism provided with a gaging member; a line gaging member movable from zero position into contact with said first named gaging member to measure the deficiency of the line; an adjustable sets gaging member connected to said line gaging member; and a proportional divider connected to said sets gaging member.

12. In a typographic composing machine, the combination of the following elements, to wit; a record strip composing machine provided with means for producing character and space signals; a line measuring mechanism; a line gaging member cooperating with the line measuring mechanism to measure the deficiency of the line; and a proportional divider coupled with said line gaging member and provided with a space gaging member.

13. In a composing machine the combination of the following elements, to wit; a record strip composing mechanism; a line gaging member cooperating with the line

measuring mechanism to gage the deficiency of the line; a proportional divider connected to said line gaging member; and an adjusting or positioning mechanism for advancing the line gaging member and operating the proportional divider to gage the deficiency of the individual spaces.

14. The combination to form a proportional divider for an automatic justification signal selecting mechanism of the following elements, to wit; two slides guided to reciprocate in parallel planes; a variable space dividing lever provided with parallel ways or members and pivotally attached at one end to one of said slides; a longitudinally movable slide engaging one member of said lever and pivotally connected to the other of said slides; and a pivot bearing shoe movably supported upon the other member of the lever and engaging an adjustable fulcrum block.

15. In a proportional divider for composing machines such as described, the combination of the following elements, to wit; a variable space dividing lever provided with parallel guiding members and pivotally attached to a slide movable on ways transverse of the lever; a slide movable on ways parallel with the first mentioned slide; a shoe pivotally connected to the last named slide and engaging one of the guiding members of the lever; and a shoe engaging the other guiding member of the lever and pivotally connected to a fulcrum block, the latter adjustable longitudinally of the lever to vary its proportions.

16. In a proportional divider for composing machines such as described, the combination of the following elements, to wit; a variable space dividing lever provided with a plurality of parallel guiding members; a space gaging slide pivotally connected to one end of said lever and mounted to reciprocate transversely thereof on guides; shoes engaging opposite guiding members of the lever and each pivotally connected to a slide or shoe reciprocating on ways parallel with those of the space gaging slide; a shoe engaging the central guiding member of the lever and carrying the fulcrum pins therefor; and adjustable fulcrum blocks supported on fixed guides extending longitudinally of the lever.

17. In a proportional divider mechanism for typographic composing machines, the combination of the following elements; to wit, a slide coupled with the line gaging device, to move proportionally therewith; a space gaging slide movable on ways parallel with said first named slide; a variable space dividing lever pivoted to one of said slides and coupled to the other in a manner to permit reciprocatory and pivotal movements with relation thereto; and a fulcrum movable longitudinally of the lever, to vary its

proportions, said fulcrum being controlled, as to position, by the space signal mechanism.

18. In a proportional divider mechanism for typographic composing machines the combination of the following elements, to wit; two slides mounted to reciprocate in parallel relation; a dividing lever engaging both of said slides and provided with a movable fulcrum; and means controlled from the space signal mechanism for shifting said fulcrum so as to vary the relation of the two arms of the lever proportionally to the number of space type.

19. In a proportional divider mechanism for typographic machines the combination of the following elements, to wit; a variable space dividing lever provided with a fulcrum adjustable longitudinally thereof, two slides guided on ways extending in parallel relation transverse of said lever, one slide connected to the power and the other to the weight end of the lever; a sets gaging lever whose weight end is connected to the power end of the space dividing lever; line gaging means connected to the power end of said sets gaging lever; and means for advancing the power end of the sets gaging lever until arrested by the line measuring mechanism.

20. In a proportional divider mechanism for composing machines the combination of the following elements, to wit; a space dividing lever provided with a fulcrum block movable longitudinally of said lever; a shoe or bearing for said fulcrum block supported on guides extending longitudinally of the lever; and means for shifting said shoe or bearing on its guides to vary the proportions of the two arms of the lever.

21. In a proportional divider mechanism for composing machines the combination of the following elements, to wit; a space dividing lever provided with a fulcrum movable longitudinally thereof; a bearing for said fulcrum guided to reciprocate longitudinally of said lever; and means for shifting said bearing to vary the proportions of the arms of the lever, including a lever, one arm whereof carries a slide or shoe engaging said fulcrum bearing.

22. In a proportional divider mechanism for composing machines the combination of the following elements, to wit; a space dividing lever provided with a movable fulcrum; a bearing for said fulcrum guided to reciprocate longitudinally of the lever; and means for shifting said fulcrum to vary the proportions of the lever, including a lever one arm whereof carries a slide or shoe engaging said fulcrum bearing and the other a shoe pivotally connected to a slide, the latter supported on guides extending transversely of the lever and connected to mechanism adapted to advance it progressively through equal intervals.

23. In a proportional divider mechanism for typographic composing machines, the combination of the following elements, to wit; a space dividing lever provided with a movable fulcrum; a movable bearing for said fulcrum; a lever for shifting or positioning said fulcrum one arm whereof carries a slide or shoe engaging the fulcrum bearing and the other carries a shoe engaging a slide mounted on ways transverse of the lever; and devices for intermittingly adjusting or advancing said last named slide, including a motor device and an escapement.

24. In a proportional divider mechanism for composing machines, the combination with the movable fulcrum of the space dividing lever, of the following elements, to wit; a fulcrum bearing movable on guides; a lever one of whose arms is coupled to said fulcrum bearing and the other to a slide; a motor device connected to said last named slide; an escapement controlling said motor; and space signal devices controlling said escapement.

25. In a proportional divider mechanism for composing machines, the combination with the line measuring mechanism and the justification space signal producing devices of the following elements, to wit; two slides or shoes mounted to reciprocate in parallel planes; a variable space dividing lever intersecting the planes of movement of said slides and connected to each of the latter; a fulcrum bearing for the lever movable on guides longitudinally thereof; a fulcrum adjusting lever one arm of which is connected to the said fulcrum bearing and the other to a slide movable in a plane transverse to and intersecting said last named lever; a motor and escapement for advancing said last mentioned slide whenever a justification space signal is produced; justification signal selecting devices connected to one of the first mentioned slides; and a gaging member connected to the other of said slides and cooperating with the line measuring mechanism to measure the excursions of the space dividing lever.

26. A proportional divider mechanism for composing machines, such as described, embracing the following elements, in combination, to wit; a space dividing lever (64) provided with three parallel members or bars forming guides; a shoe (66) provided with pivot pins mounted upon the central member of said lever and engaging fulcrum blocks or shoes (51) mounted to reciprocate upon two fixed guides (50) between which said central member vibrates; and two shoes (65) supported to slide upon the outer bars or members of the lever and each pivotally connected to one of two shoes (48) mounted in parallel relation upon guides located in a plane transverse to and intersecting the path of said lever.

27. A proportional divider mechanism for composing machines embracing the following elements in combination, to wit; a space dividing lever (64) composed of three parallel bars forming guides; two fixed guides (50) occupying planes intermediate the central and outer members of said lever; a pair of fulcrum blocks (51) supported to reciprocate upon the fixed guides and engaging fulcrum pins carried by a shoe (66) on the central member of the lever; a shoe (65) carried by each outer member of the lever and pivotally connected to one of two shoes or slides (48) supported on guides extending transversely of the lever on opposite sides thereof; and a fulcrum adjusting lever one arm whereof comprises parallel members (69) received in the spaces between the members of the space dividing lever and each provided with a shoe (71) engaging a pivot bearing in one of the fulcrum blocks at a point to one side of the fulcrum.

28. A proportional divider mechanism for composing machines such as described, embracing the following elements, in combination; to wit; two fixed guide bars (50) each provided with a fulcrum block or shoe (51) movable thereon; a space dividing lever (64) comprising a plurality of parallel members with openings for the passage of said fixed guides; a shoe (66) mounted on the central member of said lever and provided with pivots engaging the pair of fulcrum blocks; two shoes (65) riding upon the outer members of the lever and located between two shoes (48) the latter guided to reciprocate in a plane transverse to the lever and each pivotally connected to one of said shoes carried by the lever; a fulcrum adjusting lever (68) comprising parallel members (69) each equipped with a shoe pivotally connected to the fulcrum block (51); and a sets gaging lever (58) whose parallel members embrace the space dividing lever and are provided with shoes (60) pivotally connected with the shoes on the outer members of said space dividing lever.

29. In a proportional divider mechanism for composing machines the combination with a space dividing lever provided with an adjustable fulcrum controlled by the justifying space signal devices and arranged to have the movement of one of its arms gaged by the line measuring mechanism, its other arm gaging the deficiency of the spaces, of a sets gaging lever located in the line of communication between the line gaging devices and said space dividing lever and provided with means for varying the proportions of its two arms.

30. In a composing machine such as described, the combination with the line measuring mechanism and a proportional divider system for gaging space deficiency, of means for adjusting or varying the zero position of

the line measuring devices, to adapt the machine to different sets.

31. In a composing machine such as described, the combination with the line measuring and proportional divider mechanisms, of means for adjusting or varying the zero position to adapt the machine to different sets, and a register for indicating the degree of adjustment.

32. In a composing machine such as described, the combination with the units wheel of the measuring mechanism, of a zero displacement indicator and means independent of the line gage for adjusting the units wheel and line measuring devices.

33. In a composing machine provided with a line measuring mechanism and a proportional divider, the combination therewith of the following elements, to wit; a gaging member (105) carried by the units wheel of the line measuring mechanism; a gaging member (104) connected to the proportional divider mechanism and normally occupying a position to one side of the path of the first named gaging member but capable of being moved into said path and when so moved of determining one end of the line measure; a motor connected to the proportional divider mechanism for advancing its gaging member; and means for shifting the gaging member of the proportional divider and energizing its motor.

34. In a composing machine such as described, the combination with the line measuring mechanism provided with line scale and a units wheels, of a multiplying indicator em scale whose movable element is coupled with the units wheel and derives motion therefrom.

35. In a composing machine such as described, the combination with the line measuring mechanism provided with a units wheel for measuring the space value of successive type, of a multiplying indicator or em scale mechanism registering fractions of an em and provided with a driving pinion meshing with the units wheel.

36. In a record strip composing machine such as described, the combination with the series of punch bars, an actuator therefor and selective designating devices for coupling the bars to the actuator, for producing type signals, of a justification signal selecting mechanism including a designating punch bar, an actuator, means for coupling the designating punch bar and its actuator, selective means for coupling any one of a series of dimensioning punch bars and the actuator, and means for actuating the designating and selected dimensioning punch bars with the actuator.

37. In a record strip composing machine the combination with a designating punch bar and a series of dimensioning punch bars, of an actuator, an interponent for the di-

dimensioning punch bar, an interponent movable laterally of the series of designating punch bars, said interponents being normally in inoperative relation to their punch bars, and means for moving them into operative relation after the adjustment of the dimensioning interponent.

38. In a record strip composing machine such as described, and in combination with the series of punch bars and selective mechanism for producing character and space signals, of a justification signal selecting mechanism including a justification designating punch bar, an interponent pertaining thereto, an interponent movable laterally of certain of the punch bars for selectively designating the appropriate dimensioning element, an actuator, and means for operating said interponents to couple the selected punch bars and the actuator.

39. In a record strip composing machine such as described, a justification signal selecting mechanism comprising the following elements, in combination, to wit, a justification designating punch bar; a plurality of justification dimensioning punch bars serially arranged; an actuator; an interponent for the designating punch bar; and an interponent for the dimensioning punch bars movable laterally of the series.

40. In a record strip composing machine such as described, the combination of the following elements, to wit; a plurality of justification designating punch bars; a plurality of justification dimensioning punch bars serially arranged; an actuator; an interponent for one designating punch bar coupled with an interponent movable laterally of the series of dimensioning punch bars to selectively engage the latter; and a second interponent for another designating punch bar coupled with an interponent for selectively engaging one of the dimensioning punch bars.

41. In a record strip composing machine such as described, and in combination therewith an automatic justification signal selecting mechanism including the following elements, to wit; a justification designating punch bar and an interponent therefor; a series of justification dimensioning punch bars with an interponent movable laterally thereof to selectively engage any punch bar of the series; an actuator; and a proportional divider system whose divisor and dividend elements are controlled from space signal and line measuring mechanisms, respectively, coupled with said dimensioning punch bar interponent to determine its position.

42. In a record strip composing machine such as described, the combination of the following elements, to wit; a justification signal selecting mechanism including a plurality of dimensioning punch bars serially

arranged, an actuator and an interponent; a proportional divider system or mechanism controlled by the line measuring and space signal devices and operating to position the dimensioning interponent.

43. In a record strip composing machine such as described, the combination of the following elements, to wit; a justification signal selecting mechanism provided with a plurality of dimensioning punch bars serially arranged, an actuator therefor and an interponent movable laterally of the punch bars; a proportional divider mechanism for gaging the deficiency of each space in the composed line; and translating devices intermediate the proportional divider mechanism and said dimensioning interponent for measuring the traverse of said interponent in units represented by the individual punch bars of the series.

44. In a record strip composing machine such as described, the combination of the following elements, to wit; a proportional divider mechanism for gaging the deficiency of the spaces; a justification signal selecting mechanism including a plurality of dimensioning punch bars serially arranged and two selective devices movable laterally of the punch bars; a translating system or mechanism for converting the measure of space deficiency into units of the major and minor justification systems, operating to displace one of said selecting devices an amount proportional to the number of units of the major system, contained in the ascertained deficiency, and to displace the other an amount proportional to the number of units of the minor system contained in a fraction of the major system; and means for successively connecting said selective devices with the punch bars and actuator.

45. In a record strip composing machine such as described, the combination of the following elements, to wit; a justification signal selecting mechanism provided with an actuator, a plurality of dimensioning punch bars serially arranged, and an interponent movable laterally of said punch bars to selectively engage the latter; a proportional divider mechanism for gaging the deficiency of the spaces; and a translating system or mechanism for converting the space measure into units of the justification system, including a ratchet device whose teeth are spaced proportionally to the unit of justification, and means for advancing the selective interponent a distance proportionally equal to the space deficiency and subsequently retracting the same, if the measure exceeds the unit or a multiple thereof, until arrested by a tooth of the ratchet.

46. In a record strip composing machine such as described, the combination with a proportional divider mechanism for gaging the deficiency of the spaces and a movable

dimensioning punch selector, of a translating device or mechanism comprising a stationary ratchet whose teeth are spaced proportionally to the unit, a pawl coupled with the punch selector and moving in unison therewith, and means for communicating a retrograde movement to the punch selector after initial adjustment.

47. In a record strip composing machine such as described the combination with a proportional divider mechanism for gaging the deficiency of the spaces and two movable dimensioning punch selectors, of translating mechanism coupled with the punch selectors for changing the measure of space deficiency into units of the major and minor justification systems, the same including a ratchet device coupled with one punch selector and having its teeth spaced to correspond with the major unit represented by the series of punches controlled by said selector, means for retracting said selector until the ratchet is engaged, and a second ratchet whose teeth are spaced to correspond with the minor unit represented by the series of punches controlled by the second selector said ratchet being coupled with the second selector and operated to advance the latter the number of units of the minor system contained in the space covered by said retrograde movement of the first selector.

48. In a record strip composing machine such as described, the combination of the following elements, to wit; a proportional divider mechanism for gaging the deficiency of individual spaces; a justification signal selecting system or mechanism provided with a major designating device with associated selective dimensioning device, and a minor designating device with associated selective dimensioning device; and a translating system for converting the space measure into units of the major and minor systems, including means for advancing the selective device for the major system the full measure of the space deficiency and then retracting the same, a ratchet device adapted to arrest said selective device in position corresponding to the last full unit contained in the measure, and means for coupling the major and minor selective devices during the measured retrograde movement of the former to effect the displacement of the minor selective device.

49. In a record strip composing machine such as described, the combination of the following elements, to wit; a proportional divider mechanism or system; a justification signal selecting mechanism or system provided with major and minor designating and selective dimensioning devices; a translating mechanism or system including means for advancing the major selective dimensioning device the full measure of the gaged space deficiency and then retracting it,

means for arresting said retrograde movement at a point coinciding with the number of full units of the major system contained in the measure, and means for coupling said selective dimensioning device with the selective dimensioning device of the minor system during the retrograde movement of the former and measuring the displacement of the minor selective device thus effected into units of the minor system; and means for successively actuating the two sets of designating and selective dimensioning devices to produce successive justification signals.

50. In a justification signal selecting mechanism for record strip composing machines such as described, wherein a plurality of selective devices (represented by interponents 123 and 125) are set or adjusted by a space deficiency gaging mechanism, and in combination therewith the following elements, to wit; a pawl carrier coupled with one of the selective devices, to move in unison therewith and provided with two pawls; a fixed ratchet device provided with teeth spaced to accord with the major unit and arranged to be engaged by one of the pawls during a retrograde movement of its carrier; and a second ratchet device coupled with a second selective device and provided with teeth spaced to represent fractions of the spacing of the first named ratchet device and arranged to be engaged by the second pawl of the carrier during its retrograde movement to effect a displacement of the second selective device a number of units of the minor system corresponding with the fractional retrograde movement permitted the first named or major selective device.

51. In a justification signal selecting mechanism for record strip composing machines such as described, the combination of the following elements, to wit; a plurality of punch bars serially arranged; an actuator therefor; two interponents movable laterally of the punch bars for selectively coupling any one bar with its actuator; a space gaging mechanism; and a translating system or mechanism for controlling the positions of the two interponents embodying a rotary carrier geared to rotate in unison with the motion of one of the interponents and carrying two pawls the one for engaging the teeth of a fixed ratchet wheel upon the retrograde motion of said interponent and the other engaging the teeth of a ratchet wheel geared to the second interponent.

52. In a justification signal selecting mechanism for record strip composing machines such as described the combination with the pawls which engage the fixed and movable ratchets in setting the selecting devices for the major and minor justification, of means for engaging said pawls to release the ratchets and permit the selecting devices to be returned to normal position.

53. In a record strip composing machine such as described, the combination with the series of punch bars and two sets of justification interponents each including a designating and a selective dimensioning element, of two auxiliary interponents controlling special punch-bars for forming special leading signals in conjunction with the justification signals.

54. In a record strip composing machine such as described, the combination with the series of punch bars and the two sets of justification signal selecting devices each including a designating and a selective dimensioning element, of means for coupling an auxiliary punch bar with each set of justification signal selecting devices to produce leading signals.

55. In a record strip composing machine such as described, the combination with the punch bars and two sets of justification signal selecting devices or interponents arranged and operated to successively couple the selected punch bars for each justification signal with the actuator, of a plurality of auxiliary interponents each controlling a punch bar additional to those pertaining to the justification signal and means for selectively coupling each auxiliary interponent with one set of justification signal selecting devices.

56. In a record strip composing machine such as described, the combination with the punch bars and two sets of justification signal selecting devices or interponents operating successively, of an auxiliary punch bar with each set of justification signal selecting devices to act in conjunction therewith in forming the leading signal.

57. In a record strip composing machine such as described, the combination with the two sets of justification signal selecting devices, of means for coupling the designating elements of both sets and causing them to act in conjunction for the production of the sectional line closing signal.

58. In a record strip composing machine such as described, the combination of the following elements, to wit; a series of punch bars; an actuator; a justification designating interponent carried on a support movable in a direction to couple the punch bar and its actuator; a second or dimensioning interponent also carried on said support and movable laterally of the dimensioning members of the series of punch bars, to select the one corresponding in position to the ascertained justifying fraction; and means for advancing said support and the actuator.

59. In a record strip composing machine such as described, the combination of the following elements, to wit; a series of punch bars; an actuator; a plurality of interponents pivotally supported upon a frame or carriage movable toward and from the punch

bars, one of said interponents being arranged in fixed relation to a given punch bar, and the other being laterally adjustable to selectively engage any one of a group of
 5 punch bars; an auxiliary interponent in fixed relation to a given punch bar; and means for temporarily coupling said auxiliary interponent with the movable frame or carriage.

60. In a record strip composing machine
 10 such as described, the combination with a series of punch bars including a plurality of justification designating and a group of justification dimensioning bars; an actuator; and two sets of justification signal selecting
 15 and producing devices, each including an interponent opposite one of the designating punch bars and a laterally adjustable interponent controlling the group of dimensioning punch bars.

20 61. In a record strip composing machine such as described, the combination with a series of punch bars including a group of justification dimensioning and a plurality of justification designating bars, an actuator,
 25 and two sets of justification signal selecting devices each including a designating interponent and a laterally movable dimensioning interponent, of an auxiliary interponent controlling one of the designating punch
 30 bars and means for temporarily coupling it with the interponent of the other designating punch bar, to produce the sectional line closing signal.

62. In a record strip composing machine
 35 such as described, provided with justification signal selecting devices and a starter therefor, and in combination therewith, the following elements, to wit; a starting bar; a lock for said bar; a motor for said lock; and
 40 a supply port communicating with said motor and controlled by the motor of the line measuring mechanism.

63. In a record strip composing machine
 45 such as described, the combination with justification signal selecting mechanism and a starting device therefor of the following elements, to wit; a lock-out for preventing action of said starting device; a motor for
 50 actuating said lock out to release the starting device; and a pick-up for coupling the lock out with the line measuring mechanism as the latter approaches the end of the line.

64. In a record strip composing machine
 55 such as described, the combination with starting devices for the justification signal selecting system of the following elements, to wit; a lock-out for the starting device; a motor for said lock-out controlled by the line measuring mechanism; and a pick-up for coupling
 60 the actuating devices of the lock-out with the line measuring mechanism.

65. In a record strip composing machine provided with the starting devices for the justification signal selecting system, a lock-
 65 out for the starting devices and means for

actuating said lock-out when the justification area is reached by the line measuring mechanism and in combination therewith a shouldered disk driven in unison with the units
 wheel; a pawl coupled with the lock-out
 70 actuating devices and normally held from engagement with the shouldered disk by a fixed pin or abutment; and a motor for advancing the pawl carrier to cause its engagement with the shouldered disk.

66. In a record strip composing machine
 75 provided with means for closing the line and a starter therefor and in combination therewith the following elements, to wit; a lock-out for the starter; actuating devices
 80 for said lock-out controlled by the line measuring mechanism; and means controlled through the justification space mechanism for varying the time of release of the starter in proportion to the number of spaces contained
 85 in the line of composition.

67. In a record strip composing machine provided with a justification signal selecting mechanism, including a proportional divider
 90 and a starter, and in combination therewith, a lock-out for said starter provided with actuating devices controlled from the line measuring devices, and means controlled by the divisor element of said proportional divider
 95 for varying the time of action of said lock-out.

68. In a record strip composing machine the combination with the starter for the justification or resetting mechanism and a lock-out therefor, of actuating devices for said
 100 lock-out including the following elements, to wit; a part movable in unison with the line measuring mechanism as the latter approaches the end of the line; a lever in the path of said movable part and engaging
 105 a lever connected to the lock-out; and means for shifting the fulcrum of said first named lever to vary the interval between said lever and the engaging part movably with the line measuring devices.

69. In a record strip composing machine the combination with the line measuring mechanism, a proportional divider mechanism and starting devices for resetting the
 115 line measuring mechanism, and in combination therewith, the following elements, to wit; a lock-out for the starting devices; a lever coupled with said lock-out; a second lever engaging said first named lever and provided with a laterally adjustable ful-
 120 crum; a part connected with the line measuring devices in position to engage said second lever as said measuring devices approach the end of the line; and means controlled by the divisor element of the pro-
 125 portional divider for shifting the fulcrum of said second lever.

70. In a record strip composing machine such as described, the combination of the
 130 following elements for locking and releas-

ing the starting device for effecting the closing of a line, to wit; a lock-out for said starting devices; means for actuating said lock-out to release the starting device including a lever; a movable part controlled as to position by the line measuring mechanism and movable in a path intersecting said lever; and means for adjusting or varying the interval between said movable part and said lever.

71. In a record strip composing machine provided with line measuring mechanism, a proportional divider and resetting mechanism the combination therewith of the following elements, to wit; a lock-out for the resetting mechanism; a part moving in unison with the line measuring mechanism; a lever coupled with the lock-out and having an arm separated from but in the path traversed by said movable part; and a fulcrum block for said lever connected to move in unison with the divisor element of the proportional divider.

72. In a record strip composing machine provided with line measuring mechanism, a proportional divider, and resetting mechanism and in combination therewith the following elements, to wit; a lock-out for the resetting mechanism; a part movable in unison with the line measuring mechanism; an actuating lever for the lock-out having one arm located in the path traversed by said movable part; a movable fulcrum for said lever provided with a connection engaging a part movable in unison with the divisor adjusting devices of the proportional divider; and means for limiting the traverse of said movable fulcrum.

73. In a record strip composing machine the combination with the lock-out for the resetting devices and its supporting lever, of an actuating lever (180) pivotally attached to said supporting lever and engaging a slide (178) the latter located and reciprocating in line with a part (168) connected to the line measuring devices; a fulcrum slide (186) for said lever supported to reciprocate; a spring for advancing the fulcrum slide; and a connection for limiting the advance of said slide.

74. In a record strip composing machine, the combination of the following elements, to wit; a line measuring mechanism; a resetting member; a lock-out for said resetting member; and an actuating mechanism for said lock-out including a motor, a gaging member coupled with said motor and line measuring mechanism and a lever in the path of said gaging member and operating upon the lock-out to release the resetting member.

75. In a record strip composing machine the combination of the following elements, to wit; a line measuring mechanism; a resetting member; a lock-out for said reset-

ting member; and an actuating mechanism for said lock-out including a motor, a gaging member coupled with said motor and line measuring mechanism, a lever in the path of said gaging member and operating upon the lock-out to release the resetting member, and adjusting devices for varying the relation of said lever to the gaging member.

76. In a record strip composing machine the combination of the following elements, to wit; a plurality of individual type signal devices or mechanisms; and a variable lock-out mechanism controlled by the line measuring mechanism and operating to cut out of action the individual type signal devices successively in the inverse order of the space value thereof.

77. In a record strip composing machine, the combination of the following elements, to wit; a plurality of individual type signal mechanisms or devices; a line measuring mechanism; a variable lock-out mechanism adapted to cut out of action the individual type signal mechanisms of devices *seriatim* in the inverse order of their space values; and means controlled by the line measuring mechanism for actuating said lock-out mechanism.

78. In a record strip composing machine the combination with means for producing individual type signals and a line measuring mechanism of a variable lock-out mechanism coupled with the line measuring mechanism and adapted to lock-out of action individual type signal producing devices whose space value exceeds the unoccupied portion of the line.

79. In combination with a record strip composing machine provided with line measuring and individual type signal producing devices, an automatic variable lock-out for the type signal producing devices adapted to prevent the formation of type signals of a space value in excess of the unoccupied portion of the line.

80. In a record strip composing machine provided with line measuring mechanism and a plurality of type signal producing devices each coupled with a movable member, representing dimension, the latter serially arranged in the order of their space values and in combination therewith the following elements, to wit; a series of latches; a gage-block controlling said latches; and means coupled with the line measuring mechanism for shifting said gage block when the line is nearly filled to lock out of action the signal producing devices whose space value exceeds the unoccupied portion of the line.

81. In a record strip composing machine the combination with the line measuring mechanism and the dimensioning inter-ponents of the type signal producing mechanism, of the following elements, to wit; a series of latches; a movable gage block nor-

and controlling valve mechanism including a tripping latch, engaged by a trip bar, of an interponent adapted to be interposed between said tripping latch and the actuator to operate the former during the motion of the latter.

96. In a record strip composing machine the combination with the actuator, its motor and controlling valve mechanism including a tripping latch, of a trip bar adapted to engage the tripping latch and in turn engaged by the actuator to release said latch, an auxiliary latch engaging the tripping latch and an interponent adapted to be interposed between the actuator and said auxiliary latch.

97. In a record strip composing machine provided with means for automatically gaging the deficiency of the justification spaces contained in the line, a plurality of justification signal selecting devices, and a translating system for converting the measure of space deficiency into units of the major and minor justification systems, and in combination with said translating system and signal selecting devices, a motor and automatic means for controlling the latter, to first advance and then partially retract the space gaging mechanism.

98. In a record strip composing machine the combination with the motor return cylinder for the line measuring mechanism and a valve controlling said cylinder, of a motor also controlled by said valve and operating upon the holding devices of the line measuring, divisor adjusting and justification selecting mechanisms to release them preparatory to resetting.

99. In a record strip composing machine provided with line measuring and automatic justification signal selecting mechanisms, and in combination therewith the following elements, to wit; a motor return cylinder for the line measuring mechanism; a motor return cylinder for the space gaging mechanism; a release motor for the holding devices of the line measuring and space gaging mechanisms; and a valve controlling the admission of pressure to said motors.

100. In a record strip composing machine the combination with the return motor for the line measuring mechanism and the long line preventer or cut out for the punches coupled therewith, of the piston and cylinder for disengaging the punch restraining devices connected with the pressure supply for said return motor and controlled by the same resetting valve.

101. In a record strip composing machine such as described, the combination of the following elements, to wit; a plurality of punch bars; an actuator provided with a motor and a main valve mechanism therefor; an automatic justification punch selecting

system controlling said punch bars; and means for coupling the selecting members of the justification punch selecting system with the punch bars and actuating said main valve mechanism.

102. In a record strip composing machine provided with an automatic justification selecting mechanism the combination with valve mechanism controlling the actuator motor and the means for coupling selected punch bars with the actuator, of a motor device for actuating said coupling means and starting the main valve mechanism.

103. In a record strip composing machine equipped with an automatic justification selecting mechanism provided with a plurality of punch selecting or designating devices pertaining to different systems and in combination therewith the following elements, to wit; an actuator for the punch bars provided with a motor and a control valve therefor; plurality of actuating devices, one for each justification system, operating to couple the selected punch bar pertaining to its system with the actuator, and a consecutive controller mechanism for successively operating said actuating devices in conjunction with the control valve.

104. A record strip composing machine provided with an automatic justification signal selecting mechanism including two punch selecting mechanisms and means for separately coupling them with the punch bars and the actuator therefor and in combination therewith a driving mechanism for effecting successive reciprocations of the actuator and provided with a tripping device for inaugurating each movement; and a consecutive controller mechanism operating upon said tripping device and the means for separately coupling the two punch selecting mechanisms to cause the latter to operate successively upon the punches.

105. In a record strip composing machine the combination to form a consecutive controller for the punch actuating and justification signal selecting mechanisms, of the following elements, to wit; a motor driven actuator provided with a tripping device for inaugurating its action; two pawls each mounted upon a movable support in position to engage said tripping device and the actuator; a movable member provided with means for successively engaging the pawls; means controlled by the actuator for effecting successive advances of said movable member; and two coupling control members (137, 138) one for each justification signal selecting mechanism, each coupled with one of the pawls.

106. In a consecutive controller mechanism for the justification signal selecting mechanism of a record strip composing machine the combination of the following ele-

mally engaging said latches; and actuating devices for shifting said gage block to release the latches.

82. In a record strip composing machine the combination with its line measuring and type signal producing mechanisms of the following elements, to wit; a series of locking devices for the type signal producing mechanism normally disconnected therefrom; a movable gage block for effecting the application of said locking devices *seriatim* in the order of the space value of their respective type signal producing devices; and actuating devices for shifting said gage block including a member located in the path traversed by a connection of the line measuring mechanism.

83. In a record strip composing machine the combination with the actuating devices of the automatic variable cut-out for the type signal producing devices of means for gaging and controlling the movements of said actuating devices the same including a movable engaging element coupled with the line measuring mechanism.

84. In a record strip composing machine, the combination with the actuating devices of an automatic variable cut-out for the type signal producing devices, of means for gaging and effecting the movements of said actuating devices including a movable engaging element, a motor controlled by the line measuring mechanism and a pick-up for coupling said engaging element with the line measuring mechanism.

85. In a record strip composing machine, the combination with the automatic variable cut out for the type signal producing devices including the series of latches and movable gage-blocks, of the cross head engaging said latches to permit the return of the gage-block.

86. In a record strip composing machine the combination with the units rack carrier and locking pawl for the line measuring mechanism, of an actuating mechanism therefor deriving motion from the motor driven actuator for the punch bars and including a bell crank coupled with said actuator and engaging two cam bars the one connected with the units rack carrier and the other with the locking pawl.

87. In a record strip composing machine the combination with key controlled selecting devices and an actuating motor coupled therewith, of means auxiliary to the selecting devices for effecting a repetition of the signal designated thereby.

88. In a record strip composing machine provided with a series of punch bars, a motor driven actuator, a motor control mechanism and key controlled selecting devices coupled with the punch bars and motor control mechanism to start and automatically release the latter, and in

combination therewith a repeat key and devices controlled thereby for automatically resetting the motor control mechanism at the conclusion of one cycle of operations through the agency of the actuator motor.

89. In a record strip composing machine the combination of the following elements, to wit; a motor driven actuator; a motor control mechanism provided with a starter; a plurality of punch selecting devices each coupled with said starter to inaugurate the action of the motor and means for coupling the starter with the motor to cause the latter to automatically repeat its action.

90. In a record strip composing machine, the combination with the tripping latch of the punch actuator motor control mechanism, of an interponent adapted to be interposed between the actuator and said tripping latch so that during the excursion of the actuator the tripping latch will be automatically operated.

91. In a record strip composing machine, the combination with a trip for the actuator control mechanism and punch selecting devices controlling said trip to couple the selected punches with the actuator, of a repeat interponent for coupling the actuator and trip and means for operating said interponent.

92. In a record strip composing machine provided with a punch or punches for the feeding perforations a motor driven actuator and control devices for said actuator and in combination therewith a controllable means for coupling said control devices with the actuator to automatically produce successive reciprocations of the latter.

93. In a record strip composing machine provided with a plurality of punch bars, an actuator, a motor and motor control devices including a trip, the combination therewith of the following elements, to wit; one or more punch bars coupled directly with the actuator; a plurality of interponents for the first mentioned punch bars controlled by keys to selectively couple them with the actuator; actuating devices coupled with the keys and operating upon the motor control devices; and means connected with an auxiliary key for coupling the actuator and the motor control devices.

94. In a record strip composing machine provided with a paper feed, a series of punches, a motor and a keyboard mechanism for selectively coupling the punches with the motor and causing the latter to reciprocate the selected punches, the combination with the motor controlling devices of a repeat key and connections for coupling said motor controlling devices with the punch actuator in a manner to effect repeated action of the punching and feeding mechanisms.

95. In a record strip composing machine the combination with the actuator, its motor

ments, to wit; a series of punch bars provided with a motor driven actuator and a trip therefor; two justification signal selecting mechanisms each provided with means
5 for coupling it with the selected punch or punchers; two pawls, one for each coupling means, mounted upon separate movable supports in position to engage the trip and the actuator when displaced from normal positions; a movable member or bar provided
10 with teeth spaced to successively engage said pawls; and an escapement pawl controlled by the actuator and cooperating with teeth on said movable member or bar to intercept
15 the advance of the latter at each stroke of the actuator.

107. In a consecutive controller mechanism for record strip composing machines the combination of the following elements, to wit; an actuator provided with a motor
20 and a controlling trip; two links controlling said trip and each carrying a pawl movable into engagement with the actuator; a movable member provided with two teeth, one
25 for each pawl and spaced in the direction of the movement of said member to alternately engage said pawls; and an escapement pawl coupled with the actuator and engaging teeth on said movable member.

30 108. In a consecutive controller mechanism for record strip composing machines, the combination of the following elements, to wit; an actuator provided with a motor and a controlling strip; two links controlling said
35 trip and each provided with pawl adapted to engage the actuator; a movable bar or member provided with a motor and two teeth spaced in the direction of motion and each in alinement with one of said pawls;
40 a pawl coupled with the actuator and having its point in alinement with a series of teeth on said movable bar or member; means for coupling each of the first mentioned pawls with one of the justification signal selecting
45 mechanisms; and means for coupling the movable bar or member with the controller of the resetting mechanism.

109. In a record strip composing machine the combination of the following elements,
50 to wit; a series of punch bars; a motor driven actuator provided with a controlling trip for inaugurating its action; two punch bar selecting mechanisms each provided with means for coupling it with its selected punch
55 bar; a controller for the resetting mechanism; and a consecutive controller mechanism operating to successively couple the two punch bar selecting mechanisms with the punch bars and actuate the controller of the
60 resetting mechanism.

110. In a record strip composing machine the combination of the following elements, to wit; a series of punch bars; a motor driven actuator provided with a control

trip; two punch bar selecting mechanisms 65 each provided with means for coupling it with the selected punch bar and actuator; a controller for the resetting mechanism; and a consecutive controller operating upon the actuator trip intermittingly and upon the
70 two punch bar selecting mechanisms and the resetting controller consecutively.

111. In a record strip composing machine such as described provided with an automatic justification signal selecting mechanism, the combination with the motors for the
75 divisor and line measuring mechanisms, of a resetting valve controlling the induction and eduction ports thereof.

112. In a record strip composing machine 80 such as described, provided with an automatic justification signal selecting mechanism and in combination therewith a single valve controlling the induction and eduction passages of the reversing motors for the line
85 measuring and divisor mechanisms.

113. In a record strip composing machine the combination with the motors of the line gaging mechanism and the consecutive controller, of a controlling valve system operating
90 automatically to successively admit pressure on opposite sides of the line gaging motor, in setting the justification signal selecting mechanism and to subsequently admit pressure to the motor of the consecutive
95 controller for coupling the selected punch bars and actuating the latter.

114. In a record strip composing machine the combination with the motor of the line gaging mechanism for advancing and re- 100 tracting the latter and the motor for advancing the consecutive controller mechanism for coupling the selected signal devices with their actuating mechanism, of a controlling valve system adapted to first advance 105 and then retract the space gaging mechanism, and subsequently admit pressure to the motor for the consecutive controller, and a starting bar for inaugurating the action of said controlling valve system. 110

115. In a controlling valve system for the space gaging motor of a record strip composing machine the combination with the supply passages communicating with opposite ends or sides of said motor of the following elements, to wit; two communicating
115 valve chambers (244, 248) the one in open communication, with the pressure supply and provided with an exhaust port, and the other provided with three ports, an exhaust
120 and a supply for each side of the motor; a valve within the first named or pressure supply chamber normally establishing communication between the second valve chamber and exhaust port but capable when
125 moved, of opening communication with the second chamber to admit pressure therein; a valve in the second chamber arranged to

alternately open one supply port and connect the other with the exhaust for reversing the motor and means controlled by the starting device for simultaneously shifting said valves and subsequently reversing the second named valve.

116. In a controller valve system for the space gaging motor of a record strip composing machine, the combination with said motor of the following elements, to wit; two communicating valve chambers, the one in open communication with the pressure supply and provided with an exhaust port and the other provided with three ports of which two communicate with opposite sides of the motor and the other with an exhaust; a valve in the first named or pressure supply chamber normally connecting the second valve chamber and exhaust but capable of admitting pressure to said second chamber; a valve in the second chamber adapted to connect the exhaust with the supply ports for either side of the motor and open the supply port for the opposite side, an auxiliary motor connected to the supply port of the motor normally covered by the valve; a starting device coupled with the first named valve to shift and hold the latter and to the second valve through a trip controlled by the auxiliary motor.

117. In controller valve system such as described, the combination with a reversing motor of the following elements, to wit; a valve chamber (244) provided with a pressure supply and a valve (245) controlling exhaust and supply ports; a second valve chamber (248) communicating with the supply port of the first chamber and provided with an exhaust and two supply ports, the latter communicating with opposite sides of the motor and a valve (249) adapted to cover the exhaust and either supply port; an auxiliary motor communicating with the supply passage leading to one end of the principal motor; a cross head or starting device adapted to shift the first named valve (245) to open communication with the second chamber, and to shift the second valve (249) through a trip, the latter in position to be operated by the auxiliary motor when pressure is admitted to one side of the principal motor to effect an advance movement, thereby releasing the second valve while the first is retained in adjusted position and permitting said second valve to be returned and thereby reverse the motion of said principal motor.

118. In a controller valve system for the space gaging motor of a record strip composing machine, the combination with said motor of the following elements, to wit; a valve (248) controlling the admission of pressure to opposite ends of the motor; an auxiliary motor (260) connected with the

supply passage of that side of said first named motor, which is normally uncovered by the valve; and an actuating device for said valve provided with a trip in position to be acted upon by the auxiliary motor, whereby when said actuating device is moved to shift the valve both motors are energized and the actuating device automatically uncoupled to permit the return of the valve.

119. In a controlling valve system for the space gaging motor of a record strip composing machine and in combination with said motor the following elements, to wit; a valve (248) controlling the admission of pressure to opposite sides of the motor, an auxiliary motor device (260) connected with the supply on one side of the first named motor; a second valve (245) controlling the pressure supply to the first valve; an actuating device coupled with the second valve to move and hold it and with the first named valve through a trip controlled by the auxiliary motor, to first advance and then release said valve.

120. In a controller valve system for the space gaging and consecutive controller motors of a record strip composing machine and in combination with said motors the following elements, to wit; a valve (248) controlling the pressure on opposite sides of the space gaging motor; an auxiliary motor device (260) connected with one supply passage of said space gaging motor; a valve (245) controlling the pressure supply of said first named valve, an actuating device (268) engaging the second named valve (245); a trip controlled by the auxiliary motor interposed between said actuating device and the first named valve (248) to release the latter from the actuating device and permit its return; a valve (255) controlling the pressure supply of the consecutive controller motor; and means for automatically operating said last named valve to admit pressure to the consecutive controller motor upon the return of the second named valve (245).

121. In a controller valve system such as described, the combination of the following elements, to wit; a valve (248) alternately controlling two supply ports; an auxiliary motor (260) connected with one of said supply ports in position to engage a trip interposed between the starting or actuating means (268) and said first named valve; a second valve (245) controlling the pressure supply to the first named valve (248) and connected to the starting or actuating means; a valve (255) controlling a supply passage communicating with the pressure supply for the first named valve (248) controlled by the second named valve (245) said valve (255) being provided with pressure surfaces of

different extent and successively exposed to pressure admitted by the second named valve (245); a piston (262) subjected to pressure admitted through the supply port controlled by the first mentioned valve (248) opposed to the supply port communicating with the auxiliary motor; and an impact device coupled with said piston (262) and operating

upon the third valve (255) to assist in unseating the latter.

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