J. S. BANCROFT & M. C. INDAHL.

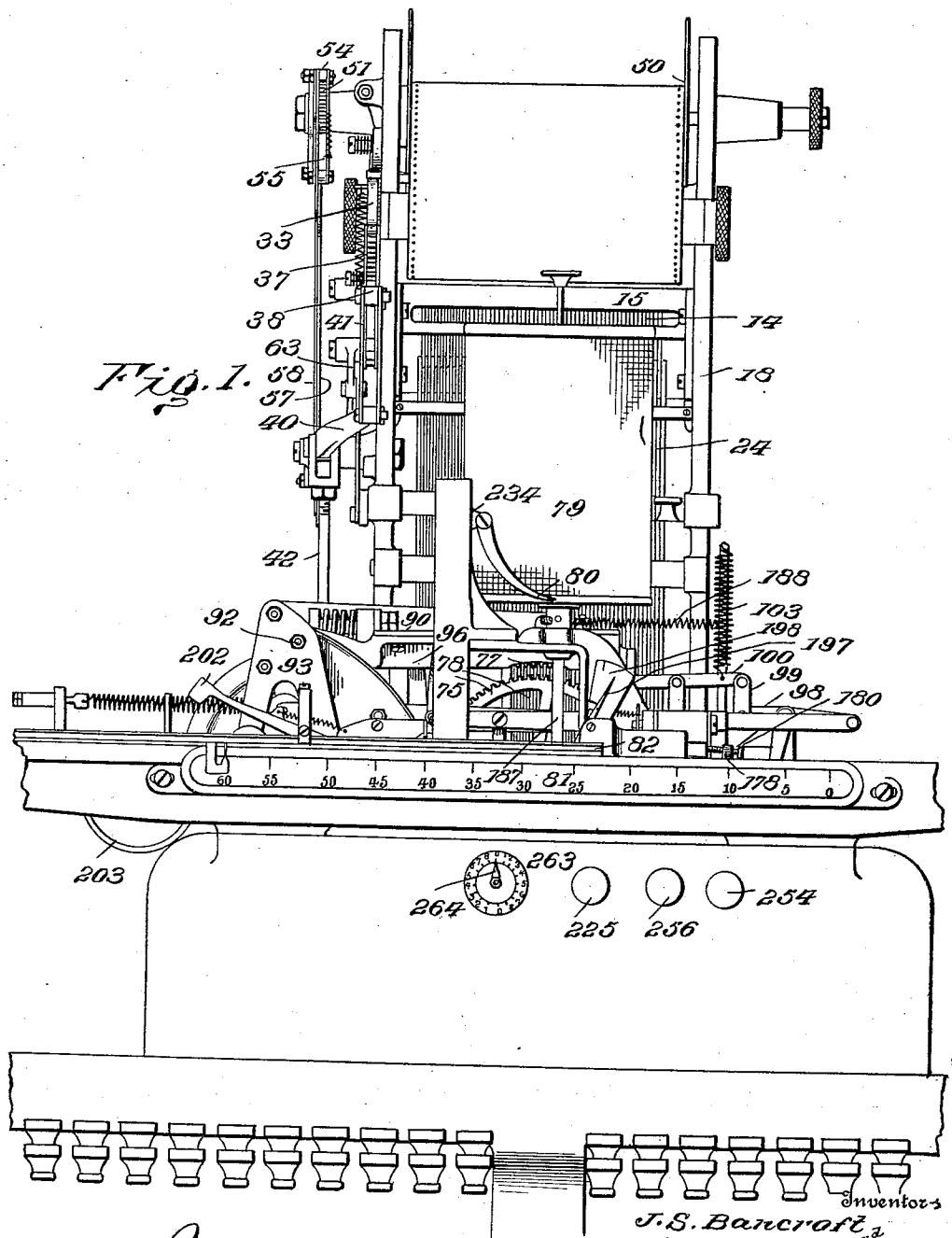
PATTERN OR RECORD STRIP COMPOSING MACHINE.

APPLICATION FILED JULY 18, 1910.

1,008,303. **Patented Nov. 14, 1911.**

15 SHEETS—SHEET 1.

Fig. 1.



Witnesses

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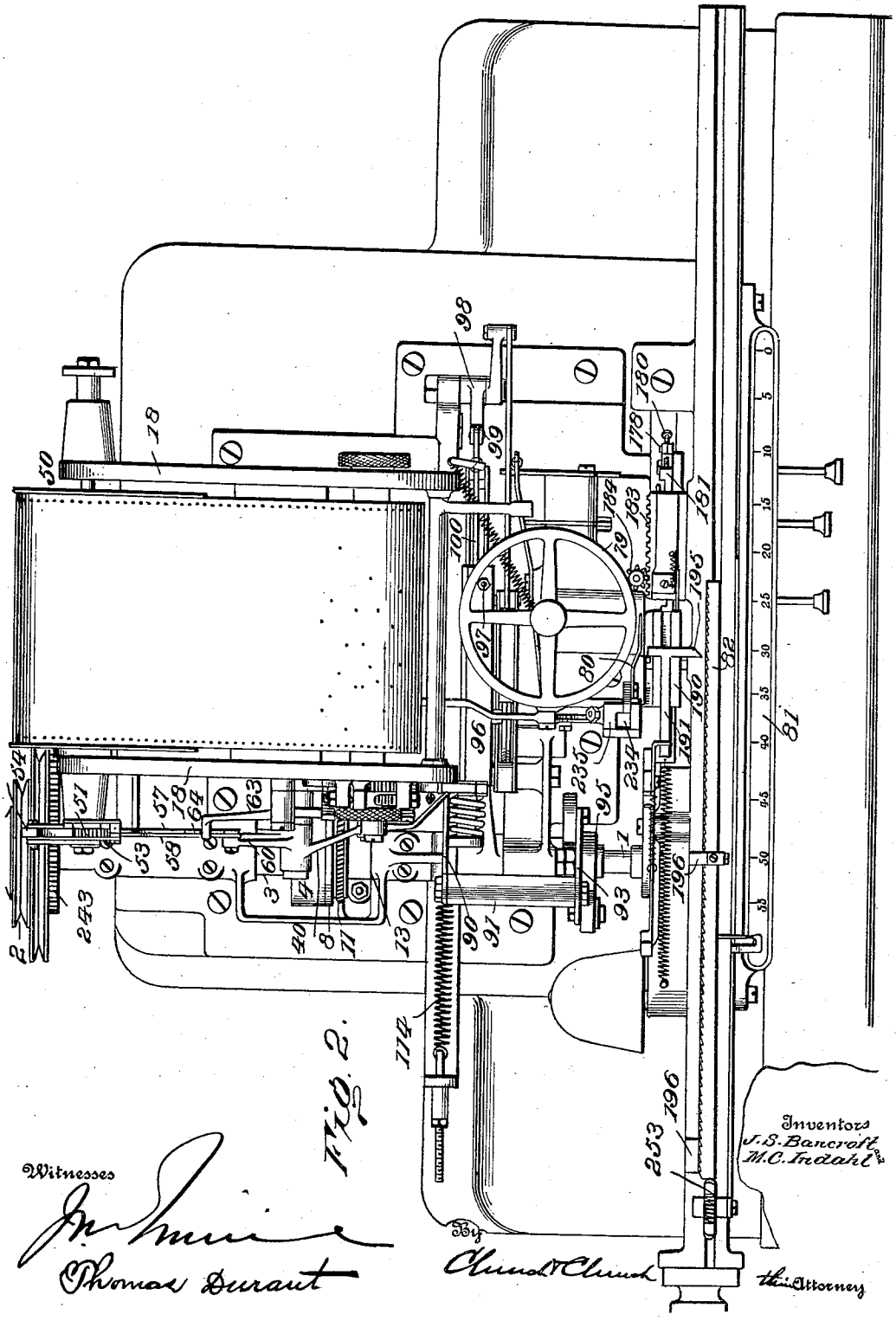

Fig. 2.

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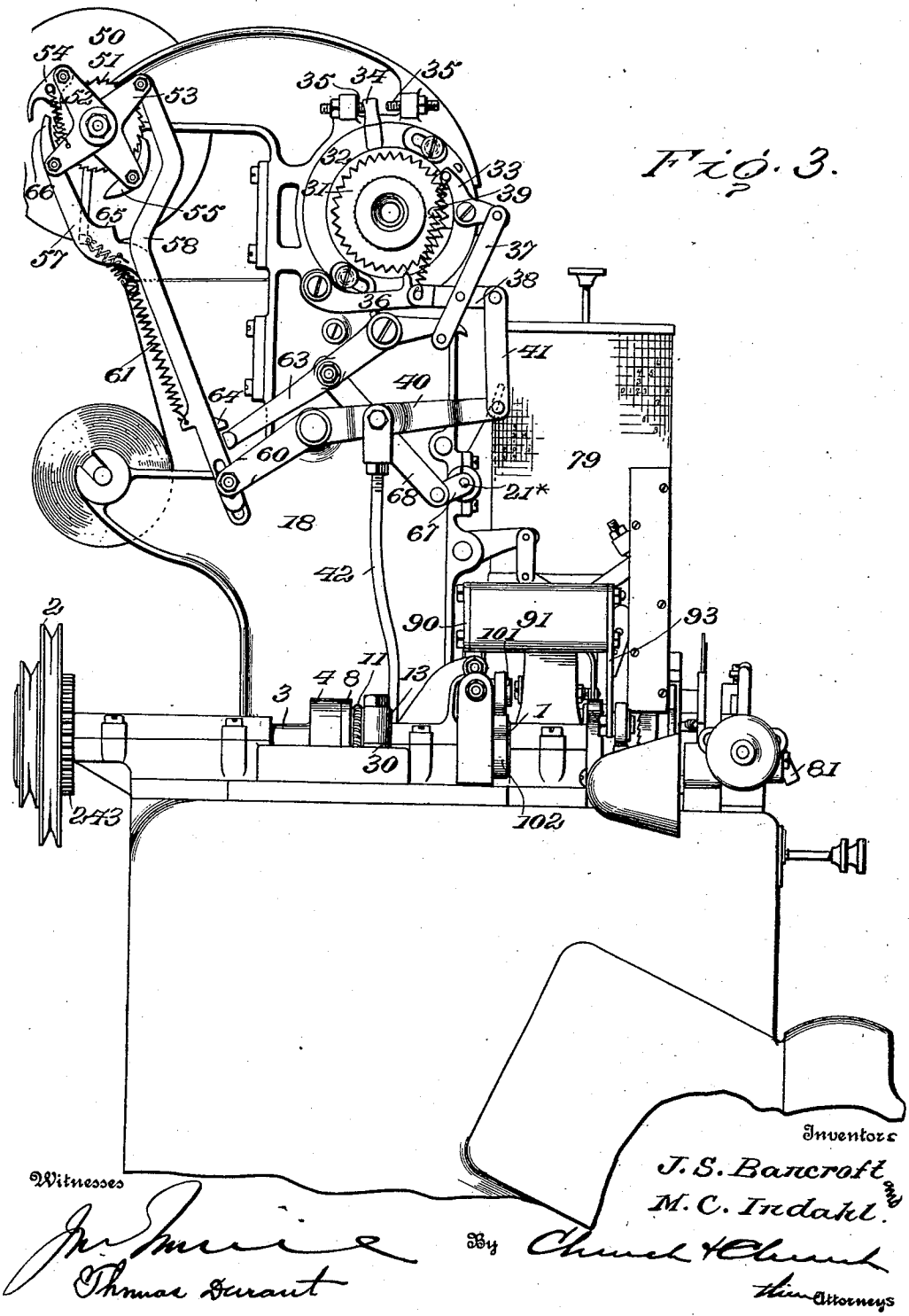

Fig. 3.

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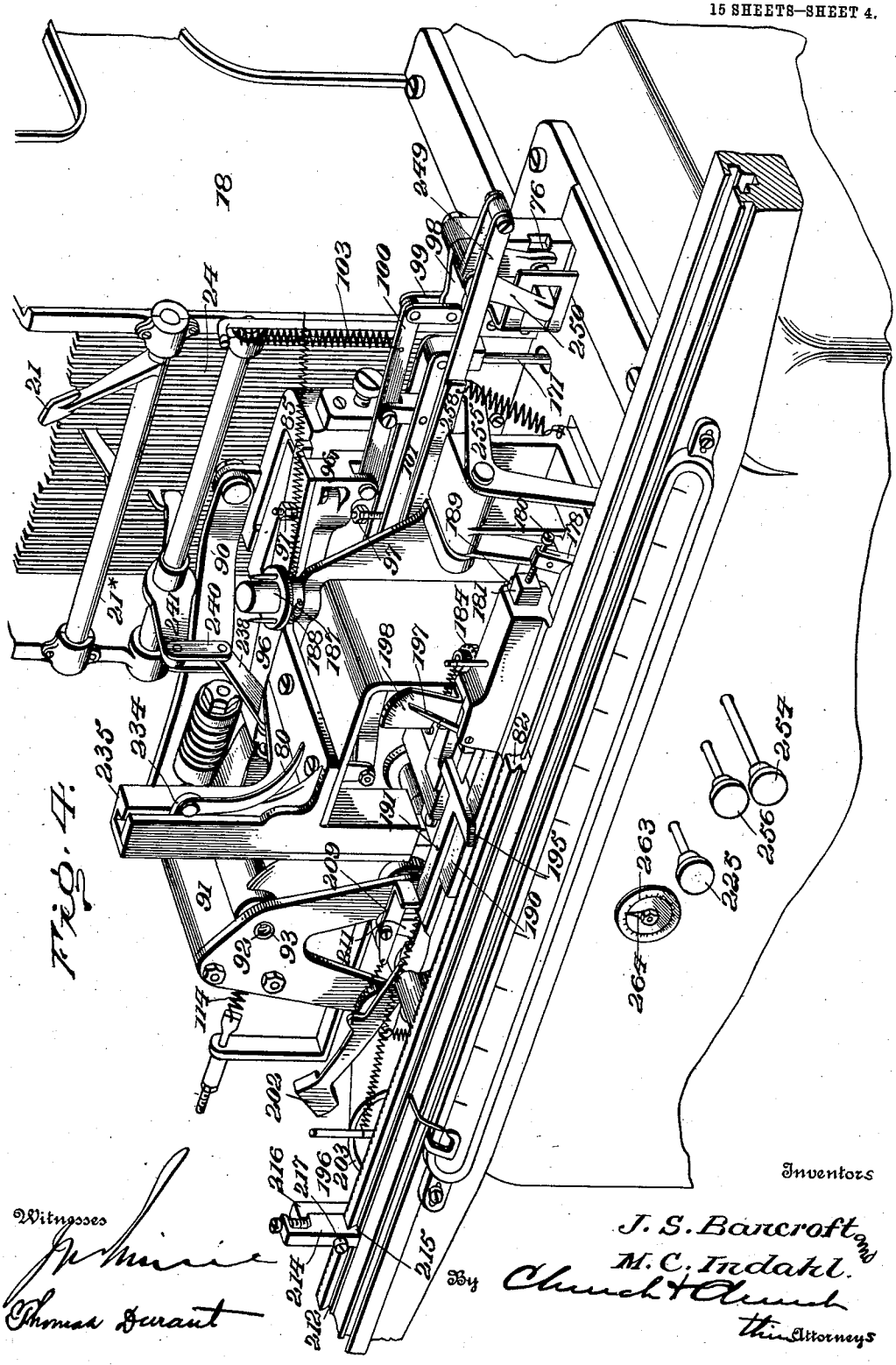

Fig. 4.

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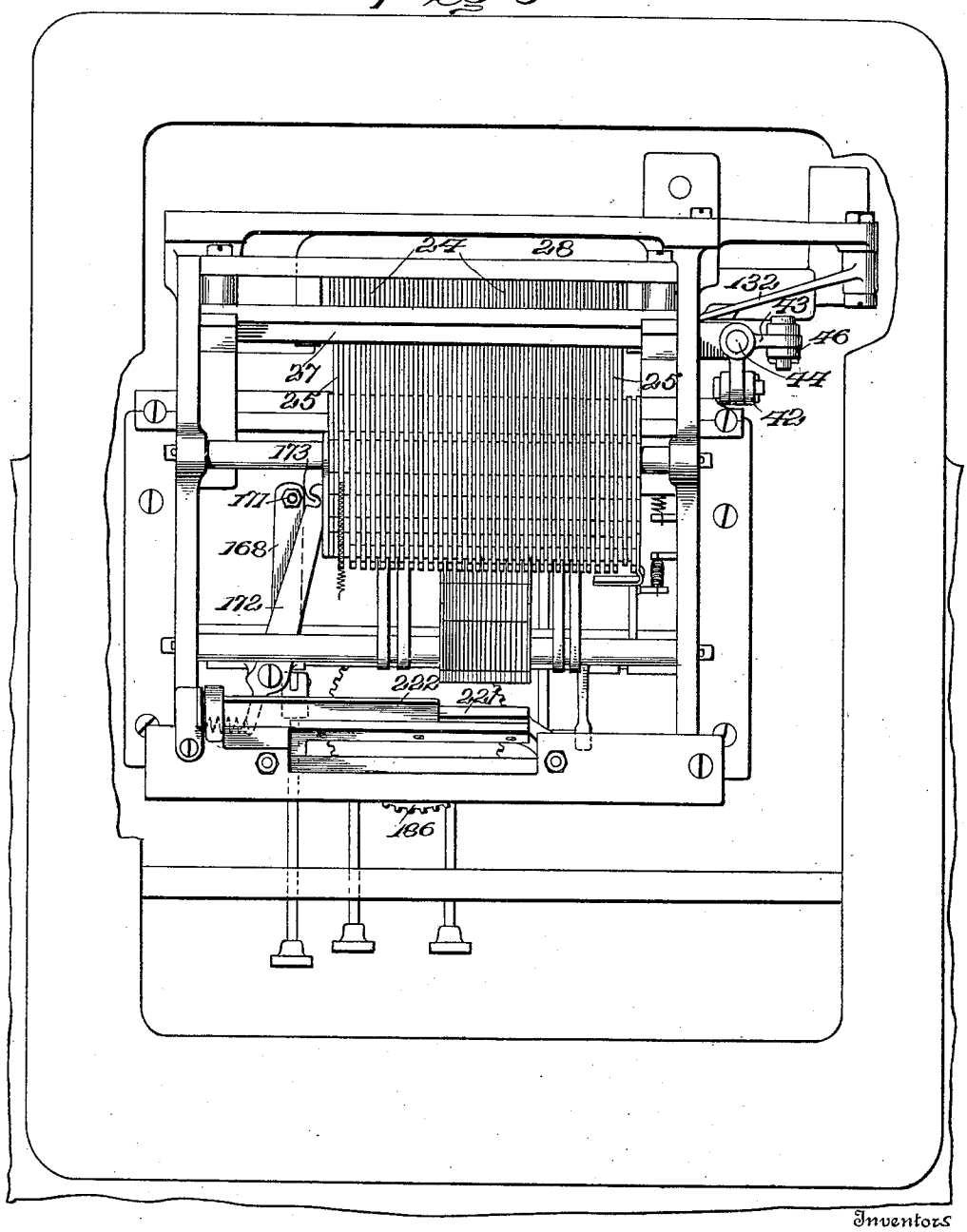
FIG. 5.



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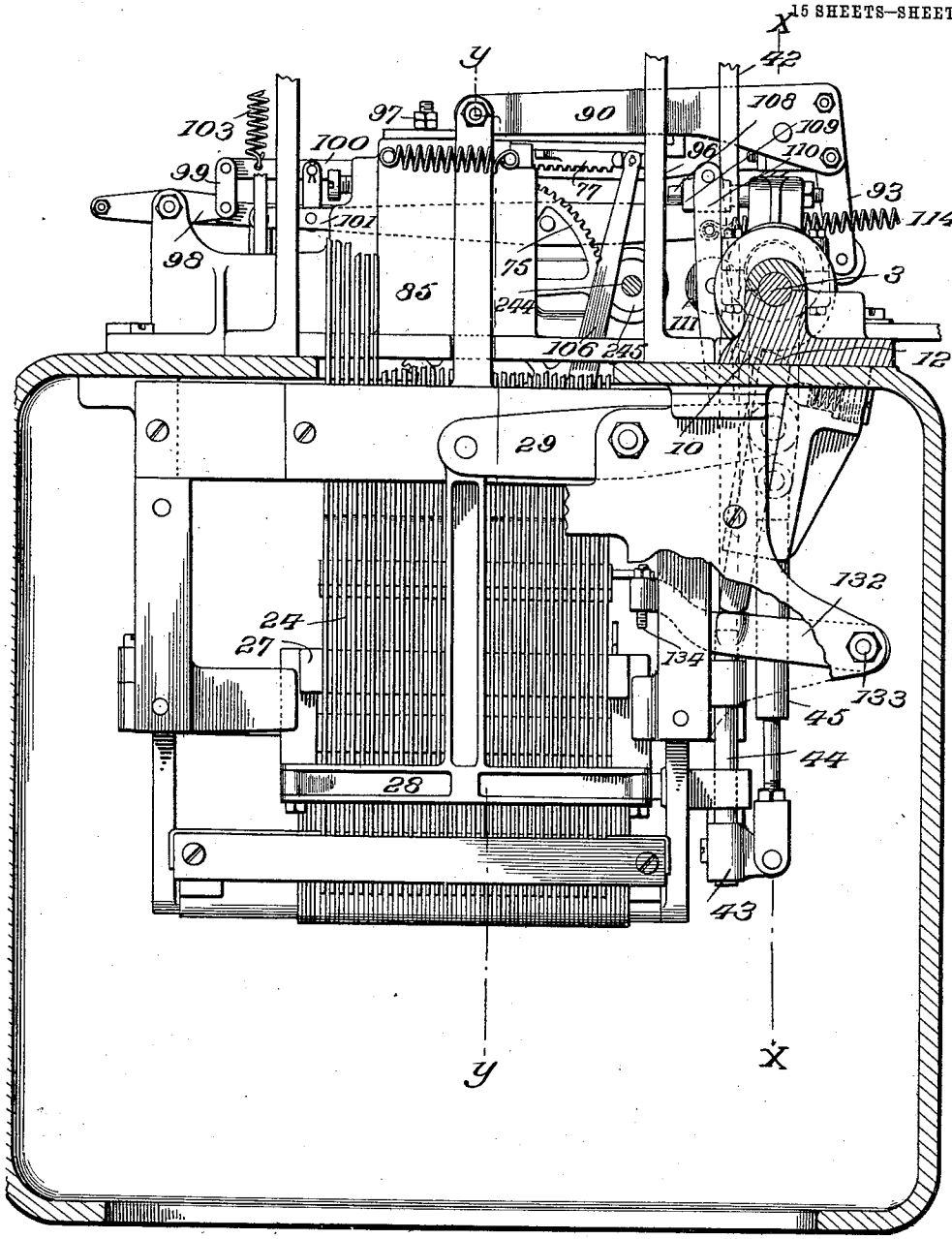

Fig. 6.

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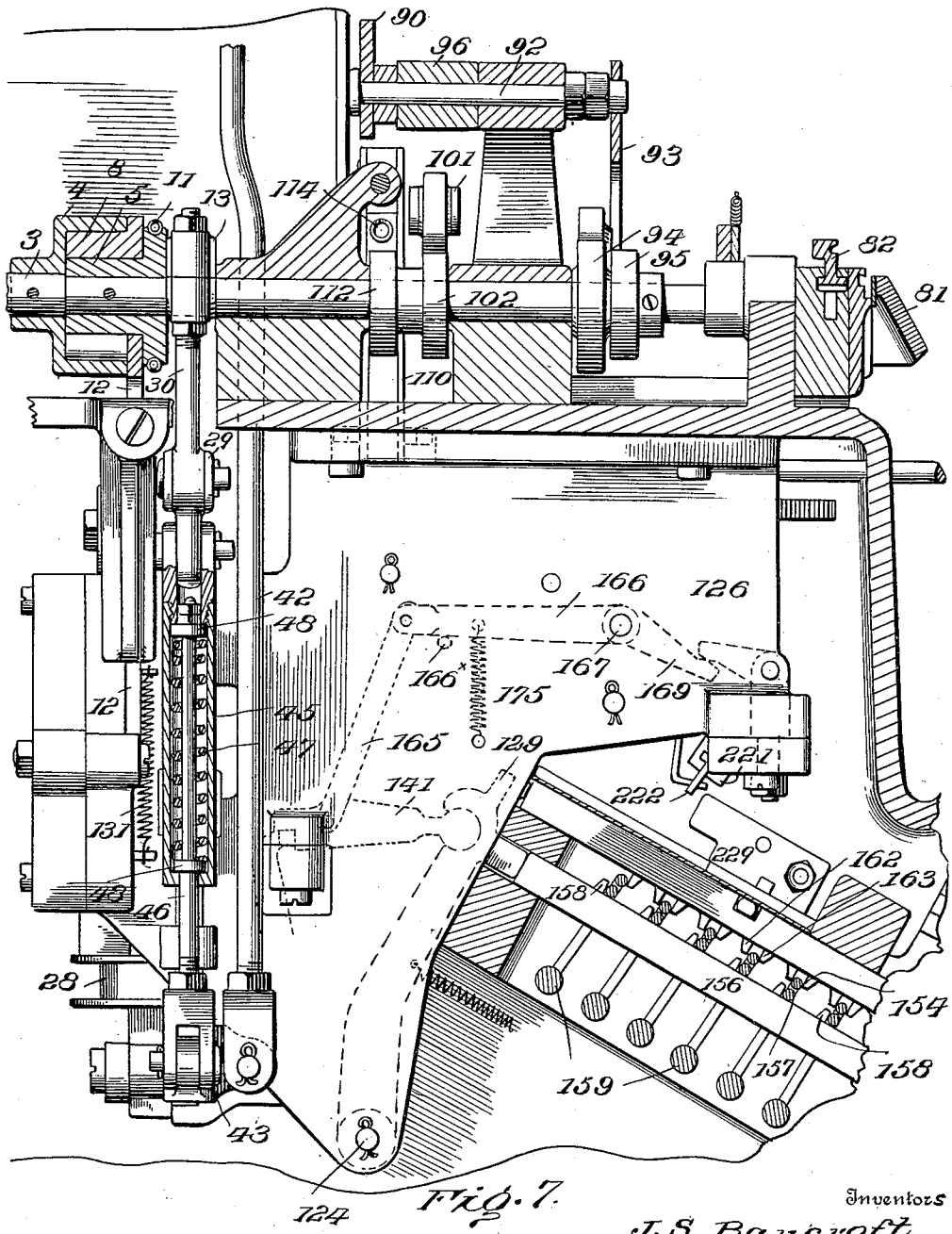

FIG. 7.

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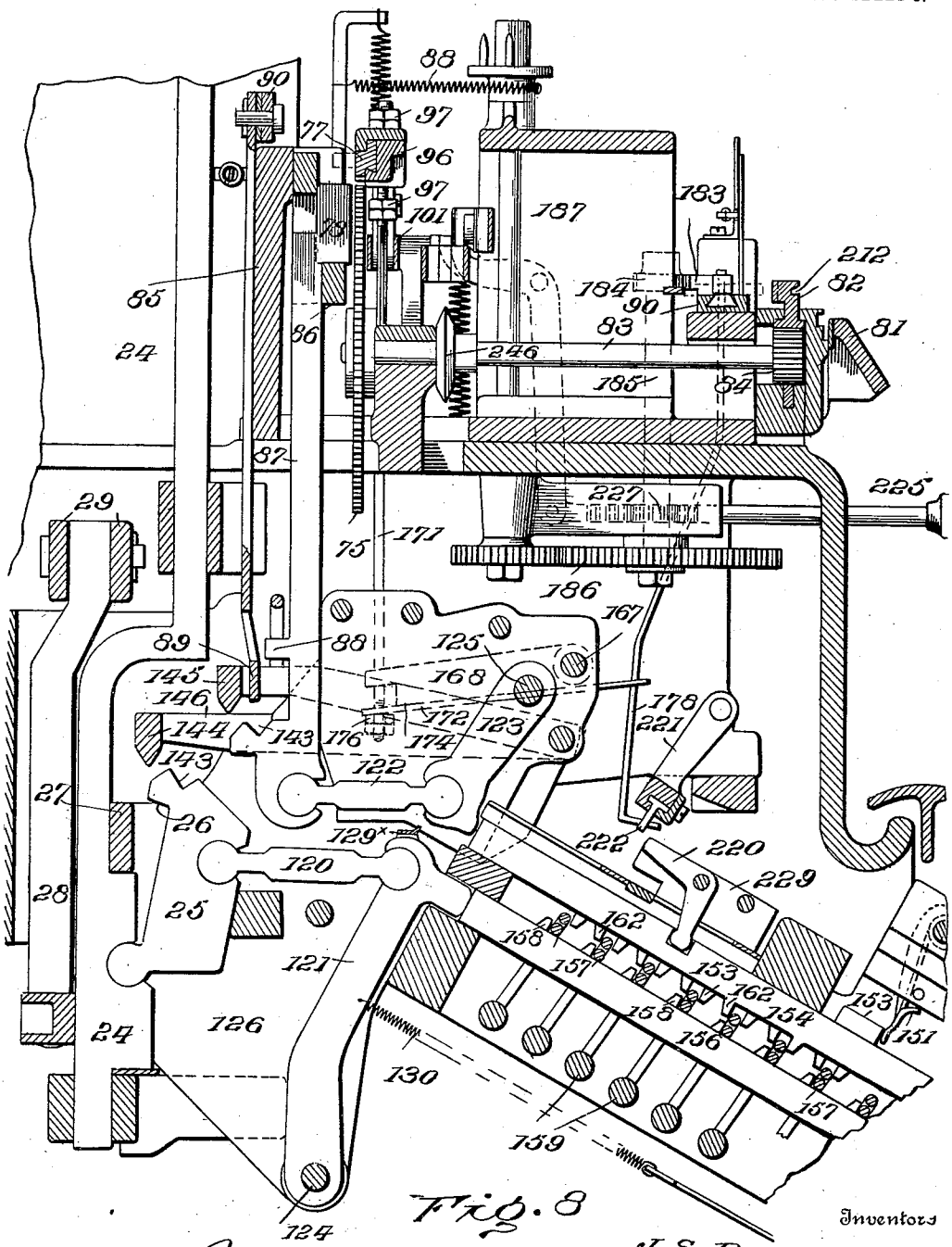

Fig. 8.

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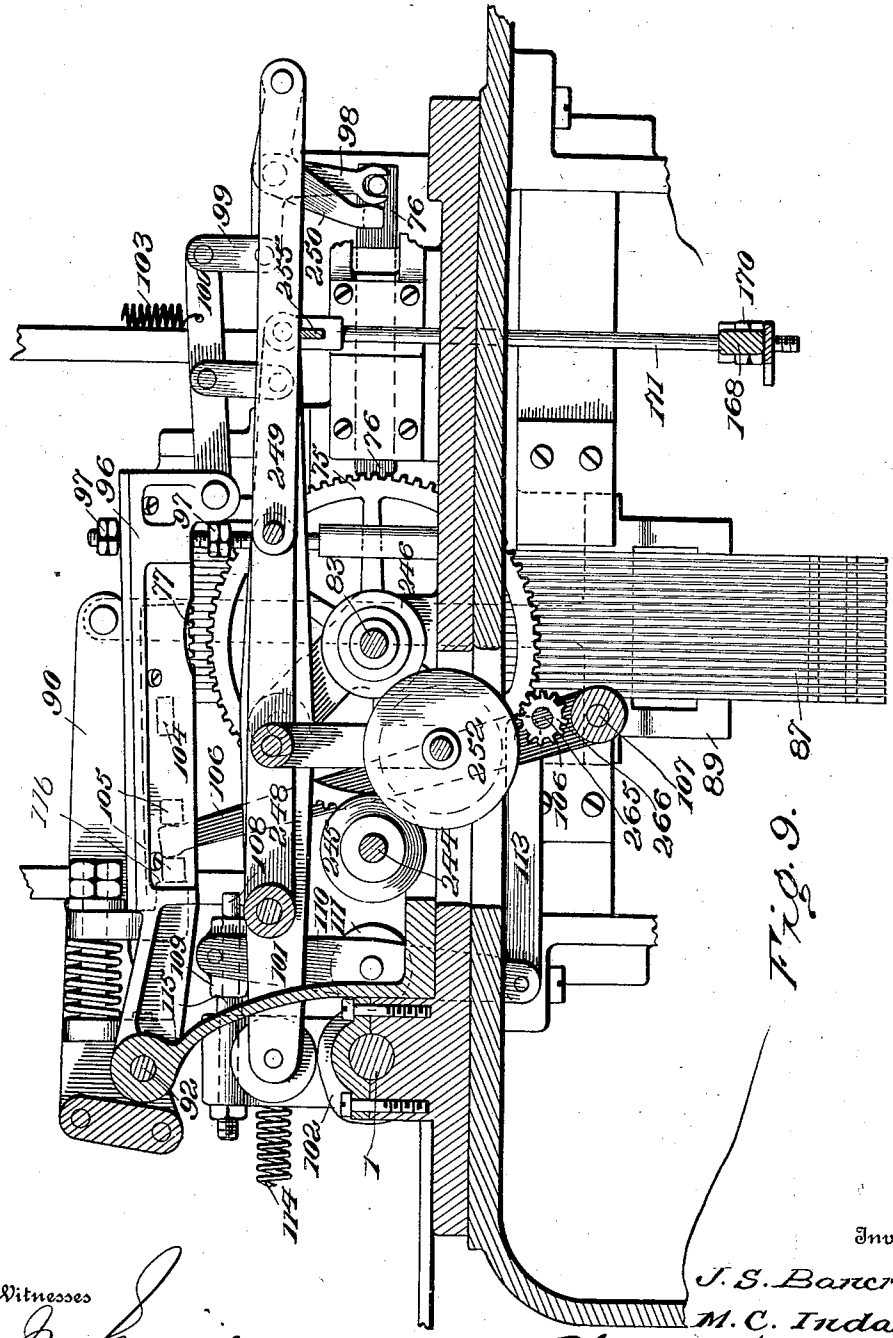

Fig. 9.

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15 SHEETS—SHEET 10.

Fig. 10.

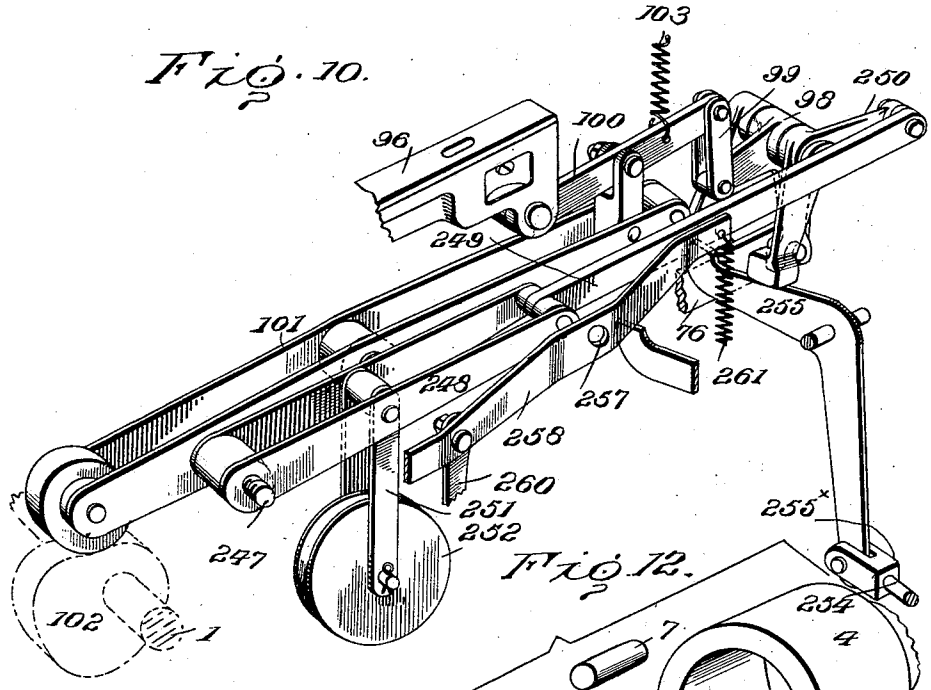


Fig. 12.

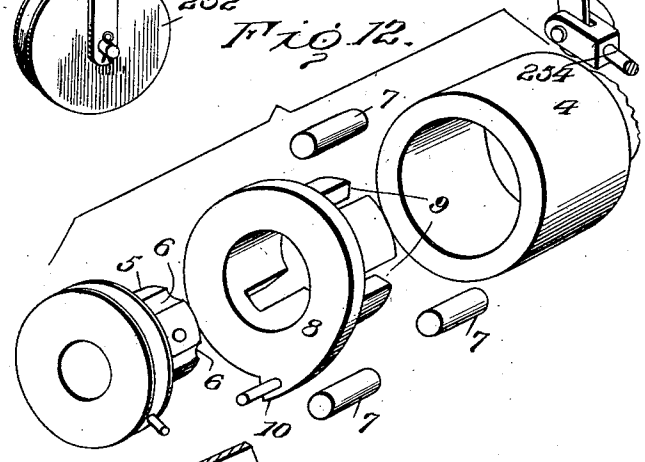


Fig. 11.

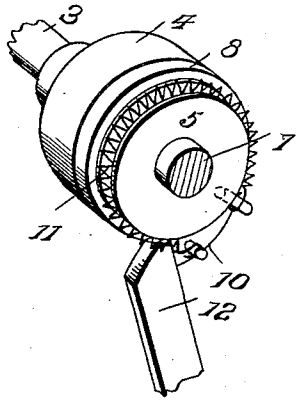
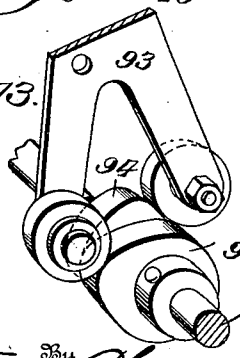


Fig. 13.



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15 SHEETS—SHEET 11.

Fig. 14.

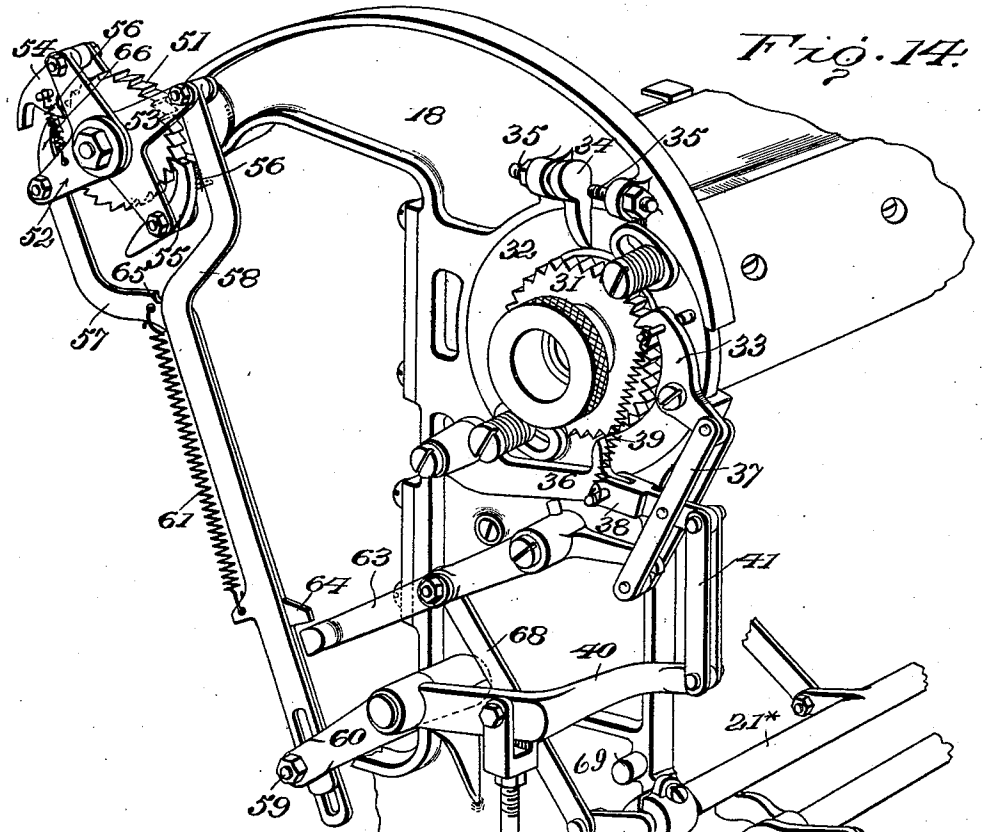
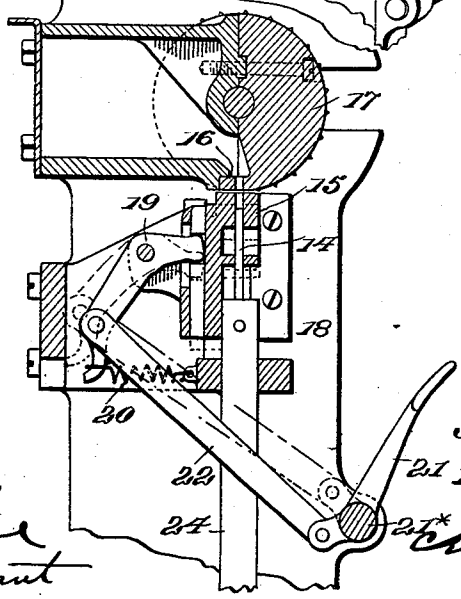


Fig. 15.



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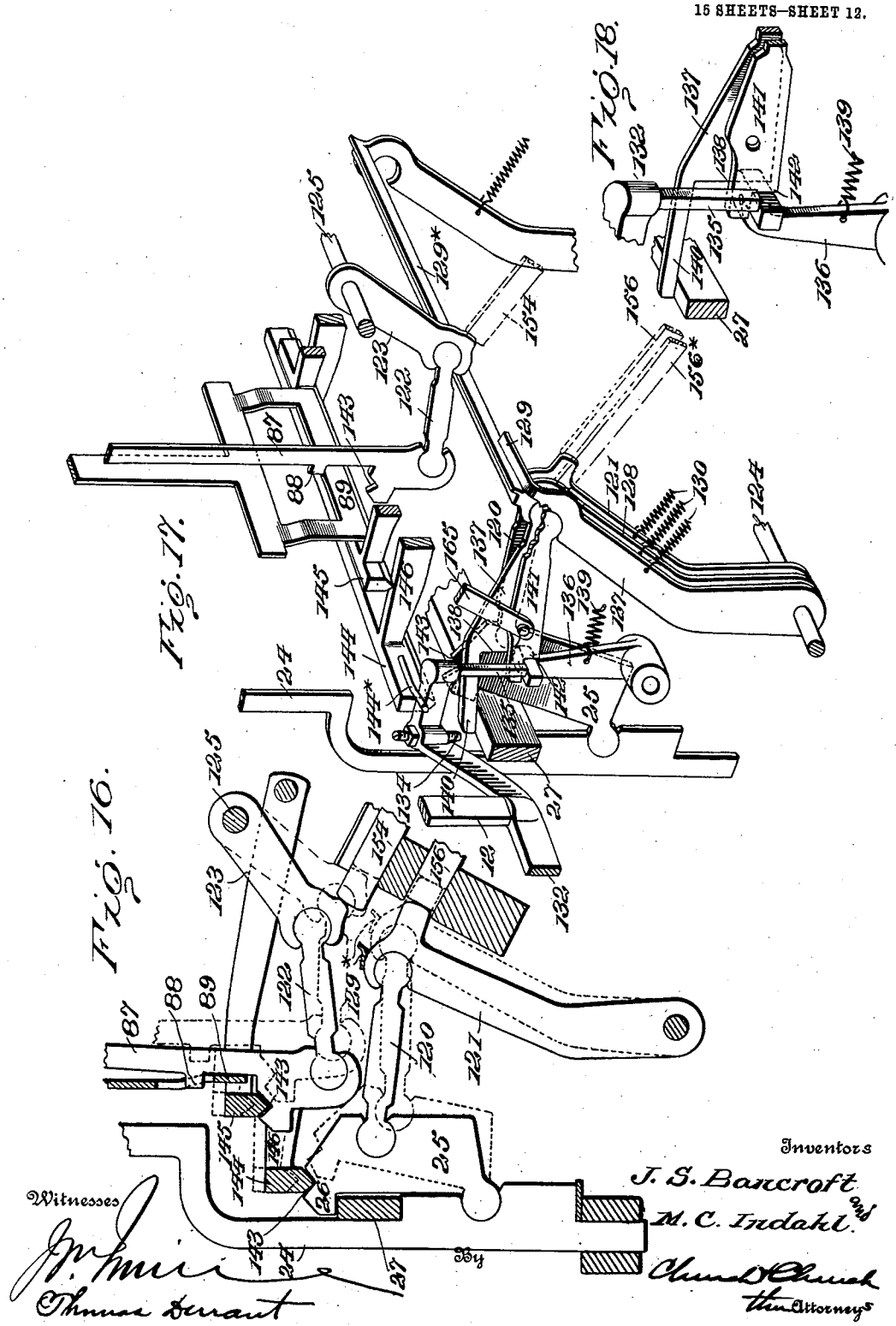

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Fig. 19.

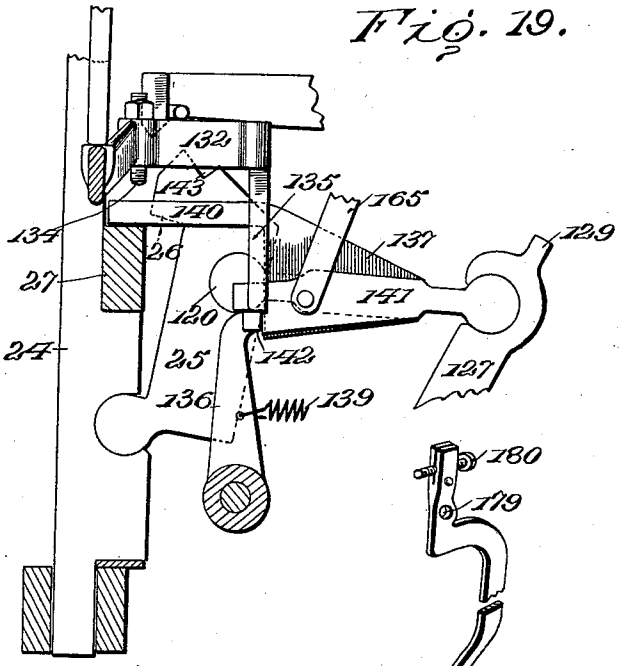

Fig. 20.

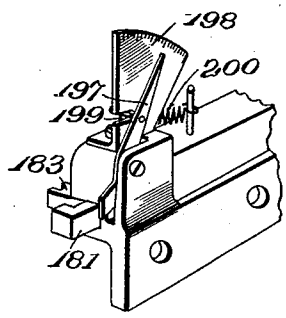

Fig. 21.

Fig. 22.

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15 SHEETS—SHEET 14.

Fig. 23.

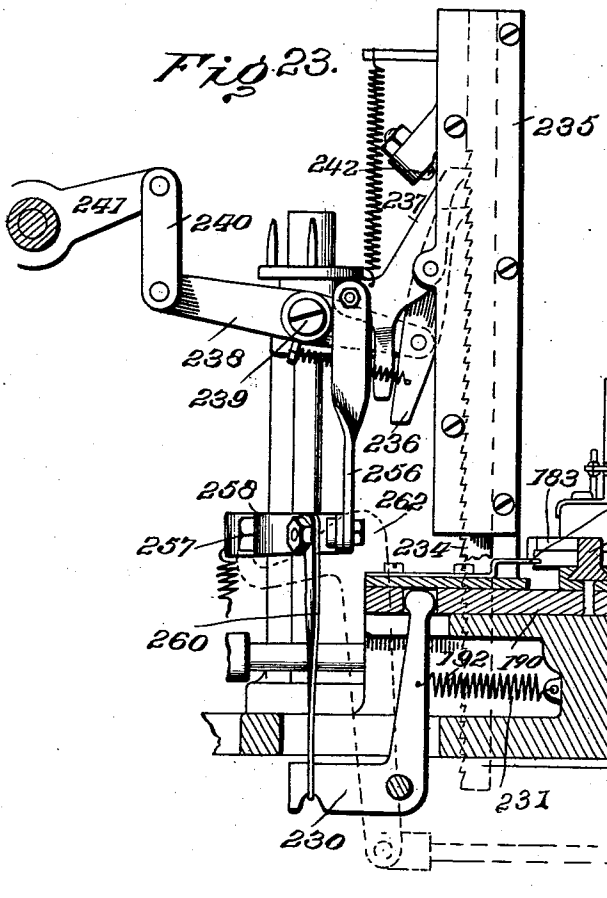


Fig. 24.

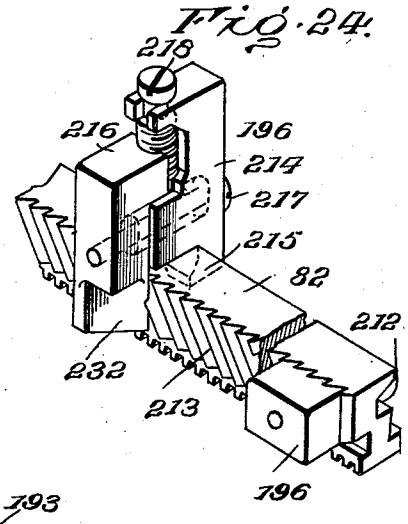
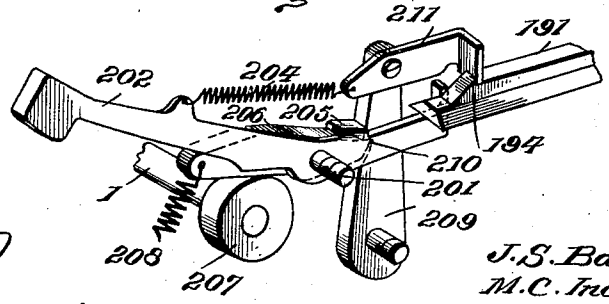


Fig. 25.



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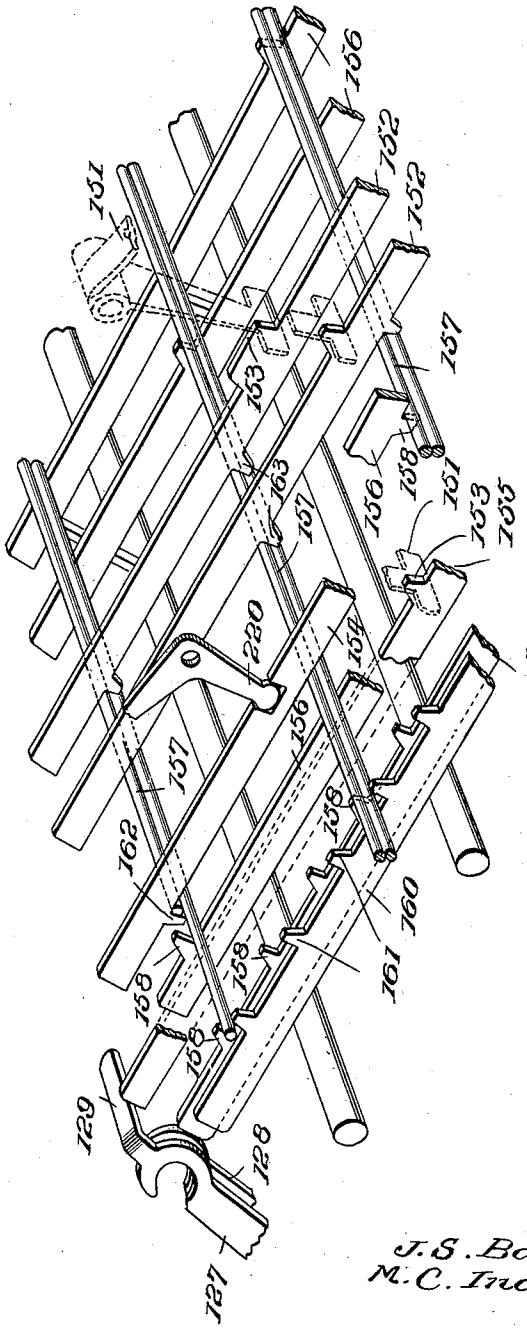

Fig. 26.

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UNITED STATES PATENT OFFICE.

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PATTERN OR RECORD-STRIP COMPOSING-MACHINE.

1,008,303. Specification of Letters Patent. **Patented Nov. 14, 1911.**

Application filed July 18, 1910. Serial No. 572,526.

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, State of Pennsylvania, have invented a certain new and useful Improvement in Pattern or 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 and letters of reference marked thereon.

This invention relates to improvements in the class of keyboard perforating machines employed in the production of patterns or controllers for automatic type casting and composing machines and equipped with a perforating mechanism including a series of key-controlled and power actuated punches, a feed mechanism for the pattern, and a units measuring and registering mechanism including a units-wheel coupled with the registering devices, a units-rack, a holding pawl, a series of stop or gage bars for the units-rack, and means for alternately engaging the units-rack and holding pawl with the units-wheel. Heretofore in machines of this class the units measuring mechanism has been provided with a motor coupled with the units wheel to impel the latter, the units rack operating as part of an escapement for admeasuring the advance of the units wheel, while the punches were either directly operated by pressure upon the keys, or through a separate motor or motors controlled by the keys.

In the prior machines referred to the pressure of the units-wheel-motor being continuous is, in the intervals between successive feed movements, received upon and borne by the escapement devices, thereby not only increasing the wear on the contacting surfaces but favoring accidental displacement of the interlocking members and racing on the part of the units-wheel.

One of the principal objects of the present invention is to produce an organized machine of the class mentioned wherein the units measuring mechanism, as well as the feeding and punching devices, receive their operating movements from a single motor device or driving shaft, the latter coupled with or receiving motion from any competent or approved form of motor or prime mover.

The invention also includes minor features of construction and combinations of parts pertaining to the organized mechanism, including, in particular, a repeat mechanism, and long line preventer, all as hereinafter fully described, the novel features being specified in the appended claims.

In the accompanying drawings illustrating a preferred form of embodiment of the invention—Figure 1 is a front elevation of the machine with a portion of the key-board cut away. Fig. 2 is a top elevation, also omitting portions of the keyboard. Fig. 3 is a left hand end elevation of Fig. 2. Fig. 4 is a perspective view, on an enlarged scale, of the units measuring mechanism and connected parts. Fig. 5 is a bottom plan view and Fig. 6 is a rear elevation of the actuating mechanism for the punch bars, stop bars, clutch and units measuring devices. Fig. 7 is a vertical section on the line *x*—*x*, Fig. 6. Fig. 8 is a similar section on the line *y*—*y*, Fig. 6. Fig. 9 is a longitudinal vertical section of the units measuring mechanism. Fig. 10 is a detail perspective of a portion of the units measuring mechanism. Fig. 11 is a perspective view of the one revolution clutch. Fig. 12 is a detail view of the clutch showing the parts thereof detached and separated. Fig. 13 is a detail view of the punch actuating cams and connections. Fig. 14 is a perspective view of a portion of the paper tower showing the feeding and tensioning winding mechanism for the record strip. Fig. 15 is a section through the punching devices showing the movable punch guide. Fig. 16 is a detail view of the connections between the punch-bar and stop-bar actuators and the selectors. Fig. 17 is a perspective view of the clutch controlling devices and their relation to the selectors and punch and stop-bar actuators. Fig. 18 is a perspective view of the clutch controlling latch and co-operating trips. Fig. 19 is a side elevation partly in section of the clutch controlling devices. Fig. 20 is a perspective view of the line-scale-rack supplemental gaging and indicating attachment. Fig. 21 is a perspective view of a portion of the repeat trip

and cut out mechanism. Fig. 22 is a detail view of the connections between the line-scale-rack pick-up and the controlling devices of the repeat action, the cut out and the justification drum. Fig. 23 is a side elevation of the justification drum pointer actuating devices, and the movable pick up carriage, the latter shown in section. Fig. 24 is an enlarged perspective of the adjustable stop for the line-scale-rack. Fig. 25 is a perspective of the bell actuating mechanism. Fig. 26 is a diagrammatic perspective of the permutation keyboard mechanism.

Like letters of reference in the several figures indicate the same parts.

The several performing mechanisms, including the punches, units-bars, paper feed, bell and units-measuring and indicating devices derive motion from a driven shaft 1, mounted in bearings on the frame, and coupled through a one-revolution clutch, with a running motor or prime mover, represented in this instance by driving pulley 2. Pulley 2 is fast on a shaft 3, located at one end of and in alinement with shaft 1, to which it is connected through a one revolution clutch, of which that illustrated, by way of example, includes a sleeve 4 fast on shaft 3 and surrounding a hub 5 fast on shaft 1. Hub 5 is furnished with one or more, preferably four, inclined or cam faced seats 6, and between each of the latter and the inner face of sleeve 4 is disposed a gripping roller 7. Interposed between sleeve 4 and hub 5 is a collar 8 provided with longitudinal grooves 9 for the reception of rollers 7 and with a radial projection or arm 10. Collar 8 turns loosely upon hub 5 and is advanced thereon, in the direction of the motion of driving sleeve 4, by a spring 11, one end whereof is connected to arm 10 and the other to an enlargement of hub 5. Through the action of spring 11 rollers 7 are advanced upon their inclined seats to grip sleeve 4 and thereby transmit motion from shaft 3 to shaft 1; but when arm 10 encounters an obstruction, such as the end of a bar 12 thrust into its path, collar 8 will be arrested and caused to retract rollers 7 relatively to their seats 6, thereby withdrawing them from gripping engagement with sleeve 4 and thus opening the clutch, which condition is maintained until by the withdrawal of bar 12, spring 11 is again permitted to exert its closing pressure.

The punches are driven from an eccentric 13 fast on shaft 1, as follows: The punches 14 are supported against lateral displacement by a guide bar 15 in close proximity to the die bar 16 on head 17. Guide bar 15 is supported in guides on the paper-tower 18, to move longitudinally of the punches toward and from die bar 16, and it is engaged by a lever 19 to which is connected a spring 20, the latter tending to advance said guide bar 15 toward die bar 16 and hold the same against a limiting abutment, to provide a narrow opening for the passage of the paper strip or ribbon. To facilitate the insertion of the paper a lever 21 fast on shaft 21*, the latter supported in bearings on the paper tower, is connected by a link 22 with lever 19, the arrangement being such that when lever 21 is in one extreme position, as indicated by full lines in Fig. 15, spring 20 will be free to advance the guide bar, and when said lever is moved to the opposite extreme position, as indicated by dotted lines, the guide bar will be retracted and so held by the passing of the connecting end of link 22 to the opposite side of the fulcrum of lever 19, a stop being provided for arresting shaft 21* as will presently appear. Each punch is detachably secured to one of a series of punch-bars 24 the latter supported in guides on the frame, and to each punch bar is pivotally attached an interponent 25 provided with an engaging shoulder 26 adapted to be moved over or into engagement with an actuator, the latter in the form of a cross bar 27 supported to reciprocate longitudinally of the punch bars in guides on the frame. To the punch actuator 27 is secured an inverted T, 28, the stem whereof is pivotally connected to one arm of a lever 29, the other arm whereof is pivotally attached to a pitman 30 carrying a strap surrounding eccentric 13. Each revolution of shaft 1 will produce a complete reciprocation of actuator 27 and of those punch bars whose interponents 25 have previously been projected into its path. The paper feed mechanism is also driven from eccentric 13. This mechanism includes a V toothed wheel 31, fast on the pin-wheel shaft; an annulus 32 movable in bearings concentric with the axis of the pin-wheel shaft and carrying a driving pawl 33 engaging wheel 31 and a lug 34 movable between stops 35; a holding pawl 36 pivoted on the frame; a link 37 connected to pawl 33; a lever 38 pivoted to link 37 and pawl 36; a spring 39 connecting the operating ends of pawls 33 and 36; and an actuating lever 40 coupled with lever 38 through a link 41. The arrangement is such that when lever 40 is at the upper extremity of its movement, as illustrated in Fig. 14, annulus 32 will be arrested by the forward stop 35 and pawl 33 held in engagement and pawl 36 out of engagement with wheel 31 by the tilting of lever 38 on link 37, thereby increasing the tension of spring 39. If, now, lever 40 is retracted, to tilt lever 38, the reaction of spring 39 will effect the engagement of holding pawl 36 prior to the withdrawal of actuating pawl 33, and thereafter during the continued downward movement of lever 40, to retract annulus 32 and its driving pawl 33, lever 38 will fulcrum upon the holding pawl and insure the engagement of the latter

with wheel 31. When the motion of lever 40 is reversed, driving pawl 33 will engage wheel 31 before holding pawl 36 is withdrawn, and during the return or upward movement of said lever 40 the feed movement will be communicated to the pin wheel shaft.

Actuating lever 40 is connected by a rod 42 to a head 43, the latter fast on a rod 44 supported to reciprocate longitudinally in bearings on the frame, and said head 43 is in turn connected with the punch operating pitman 30 through a compression coupling formed, in this instance, by a sleeve 45 pivotally attached at one end to pitman 30, a rod 46 pivotally attached at one end to head 43, and a spring 47 interposed between collars 48, the latter movable upon rod 46 between shoulders 48. Opposite ends of sleeve 45 engage collars 48 so that the movement of said sleeve in either direction will be transmitted to rod 46 through spring 47, to compensate for an excess of movement of pitman 30 over that permitted lever 40 by the engagement of annulus 32 with stops 35, and to prevent breakage if from any cause the movement of lever 40 is prevented. Through actuating lever 40 eccentric 13 is also caused to operate the receiving spool 50 of the paper feeding mechanism, as will next appear. Pivoted upon the shaft of ratchet wheel 51, to which the winding spool is coupled in the usual manner, are two levers 52, 53, the first carrying pawl 54 and the second pawl 55, each held in engagement with said ratchet wheel by a spring 56. A bar 57 is connected to lever 52 on one side the axis of wheel 51, and a similar bar 58 is connected to lever 53 on the opposite side of said axis, the arrangement being such that bars 57, 58, move in opposite directions in effecting the forward or feeding movements of their respective pawls 54, 55. The lower ends of bars 57, 58, are slotted to receive a pin 59 carried by an arm or extension 60 of the feed actuating lever 40, and a motor spring 61 is connected at opposite ends to said bars 57, 58, respectively.

The arrangement is such that as actuating lever 40 is depressed to retract driving pawl 33 preliminary to the feeding movement, pin 59 will engage bar 57 to retract pawl 54; and upon the reverse or feeding movement of said actuating lever bar 58 will be moved to retract its pawl 55. Thus, during each complete reciprocation of the feed actuating lever 40, pawls 54, 55, will be successively retracted, and as the bars 57, 58, to which said pawls are connected are coupled to opposite ends of the same motor spring and are arranged to move in relatively opposite directions during the feeding movements of their respective pawls, a constant and more nearly uniform degree of tension can be maintained upon the strip than where a single spring actuated pawl is employed for the purpose, inasmuch as the power of the spring is restored during the winding motion and the tension is maintained on the strip by the action of one or the other pawl while such restoration of power is being effected, consequently there is no relaxation of the tension incident to the restoring action.

It is desirable that the winding spool should be disconnected from its tensioning and impelling devices, and the pin wheels released from their feeding devices when a new strip is being applied, and as this coincides in point of time with the more frequent occasions for the withdrawal of guide bar 15, provision is made whereby the turning of shaft 21* to retract said guide bar will automatically throw pawls 54, 55, out of engagement with ratchet wheel 51, and driving pawl 33 out of engagement with toothed wheel 31, so that the pin wheel shaft and winding spool can each be freely turned by hand and in either direction. With these ends in view, a lever 63 is so pivoted on the side of the paper tower that one arm stands opposite a shoulder 64 on bar 57 with the opposite arm opposite a bearing on an extension of link 37. Bar 57 is provided with an engaging shoulder 65 opposite the tail of pawl 55 and an extension 66 opposite the tail of pawl 54, and the several members are so proportioned and arranged that when lever 63 is tilted from its normal position, Fig. 14, it will, through its engagement with link 37, tilt pawl 33, to withdraw its engaging end from wheel 31, and, through its engagement with shoulder 64, advance bar 57 until shoulder 65 and extension 66 contact with and withdraw pawls 54, 55, from ratchet wheel 51. Lever 63 is coupled to a crank arm 67 on shaft 21* through a link 68. When shaft 21* is turned to retract guide bar 15 and pawls 33, 54 and 55, the pressure of spring 20 on shaft 21* is shifted from a point below to a point above the axis of said shaft, thereby tending to rotate the latter in the reverse direction, and by arranging a stop 69 on the frame in the path of crank arm 67, spring 20 Fig. 15 is utilized for retaining said guide bar and pawls both in the active and inactive positions to which they are carried by the rotation of shaft 21*.

The units measuring and indicating mechanism includes the usual units wheel 75, holding pawl 76, units-rack 77, series of stop-bars 78 for admeasuring the excursions of the units-rack when in engagement with the units-wheel, justification-drum 79, pointer 80, line-scale 81, and line-scale-rack 82, the latter connected to the units wheel through shaft 83 and pinion 84; but the actuating devices, more especially those con-

trolling the units rack, holding-pawl and stop-bars, have been materially changed and modified to accommodate said mechanism to the single motor drive system of the present invention, as will presently appear.

The stop-bars are disposed side by side in sequence between the side bars of the stop-bar-frame 85, and are normally suspended upon a cross bar 86. Each stop bar is provided with a dependent arm or stem 87 provided with an off-set 88 adapted, when said stem is swung rearwardly, to be engaged by an actuator 89, the latter guided on the frame to reciprocate longitudinally of said stems.

To the stop-bar-actuator 89 is pivotally connected an arm 90 secured to a head 91, fulcrumed at 92 on bearings on the frame and carrying a furcated arm 93 straddling shaft 1, the branches of said arm 93 being spread laterally, the one engaging cam 94 and the other cam 95, both fast on shaft 1. Thus, at each complete revolution of shaft 1, actuator 89, together with such of the stop-bars as are at the time engaged therewith, will be compelled to make a complete reciprocation.

The units-rack 77 is supported to reciprocate longitudinally in guides in the units-rack-carrier 96, the latter pivoted at one end upon fulcrum 92 while its opposite end is free to vibrate between adjustable stops 97, to alternately engage the units rack with the units-wheel, and to withdraw the same therefrom. The holding pawl 76 is movable radially of the units-wheel and is connected to the units-rack-carrier 96 through bell-crank lever 98, link 99, and lever 100, the latter pivotally supported upon one end of lever 101 whose opposite end carries a roller engaging a cam 102 on shaft 1. To lever 100, at a point intermediate link 99 and the fulcrum of said lever on lever 101, is connected a spring 103, the latter exerting pressure in a direction to advance both the units-rack-carrier and the holding pawl toward the units-wheel, thereby insuring the seating of one of said members before the other can be withdrawn from the units-wheel. Units-rack 77 is provided with a lug 104, for engaging the stop-bars, when the latter are projected into its path, and with two bearings 105 between which is received the end of the actuating lever 106, the latter pivotally supported upon the frame, as at 107.

Supported to reciprocate transversely of shaft 1, as upon a pin 108 fast at one end upon the frame, is a slide 109 to which is pivoted one end of a lever 110 carrying a roller 111 in position to engage the periphery of a cam 112 fast on shaft 1, while the opposite end of said lever is connected by a link 113 to units-rack-actuating-lever 106 at a point intermediate its fulcrum and the units-rack, and to said lever 110, at a point intermediate roller 111 and slide 109, is connected a retracting spring 114. The arrangement is such that when shaft 1 is at rest the low point of cam 112 will be presented to roller 111, and the reaction of spring 114 will hold slide 109 against its bearing 115, thereby causing units-rack 77 to be retracted and held against its gaging abutment 116 on the units-rack-carrier. When, however, shaft 1 is revolved, and cam 112 is thereby caused to displace lever 110, the resistance of spring 114 being greater than that of the units-rack, lever 110 will be tilted upon its fulcrum on slide 109 without causing displacement of the latter, and units-rack 77 will be advanced until it encounters a projected stop-bar, whereupon said units-rack will be arrested, and the resistance being thereby increased above the capacity of spring 114, the latter will yield, permitting slide 109 to move away from its bearing 115.

The timing is such that the advance or operating stroke of the units-rack takes place after the withdrawal of the holding pawl and the engagement of the units-rack with the units-wheel, while the return stroke of said units-rack occurs only after the holding pawl has been engaged and the units-rack withdrawn, hence the admeasuring movement derived from cam 112 and transmitted to the units-wheel and connected mechanism is measured by that one of the stop bars at the time projected into the path of said units-rack, and no pressure is exerted upon the units wheel, to turn the latter, save during this feeding movement.

It is next in order to explain the means for uniting the several mechanisms hereinbefore described into an organized machine competent to produce the desired series of signals and at the same time register the unit values thereof. This includes the means for selectively engaging the punches and stop-bars with their respective actuators, for controlling thhe clutch intermediate the prime mover and the driving or cam shaft 1 from which the said actuators as well as the units-registering mechanism derive their movements, and for returning the units-measuring mechanism to starting position at the beginning of each line of composition.

Each of the punch bar interponents 25 is connected by a link 120 to one of a series of selectors 121, and each stop-bar stem 87 is in like manner connected by a link 122 to one of a series of selectors 123. Selectors 121 are pivotally supported from their lower ends upon a rod 124, and selectors 123 are in like manner supported from their upper ends upon a rod 125, said rods being in turn mounted in a frame 126 detachably secured to the main frame.

Supported upon rod 124 and arranged in series with selectors 121 are two additional selectors 127, 128, the former provided with an offset or arm 129 and the latter provided with a bar 129* extending across the ends of selectors 121 and supported at its opposite end upon said rod 124. Each of the selectors 121, 127 and 128, is furnished with a retracting spring 130, while selectors 123, together with the units-bar stems are returned by gravity aided by bar 129*.

Clutch-opening bar 12, movable longitudinally in guides on the frame, is provided with a retracting spring 131, and rests upon a lever 132, pivoted to the frame at 133. The inner or free end of lever 132 projects above punch-actuator 27 and is provided with an adjustable bearing 134 for engaging said punch-actuator when the latter is elevated to advance the punches. Said lever 132 is also provided with a bearing 135 adapted to engage and be upheld by a movable support in the form of a latch 136 pivoted to swing into and out of the path of said bearing. To selector 128 is pivoted one end of a trip 137, the latter provided with a shoulder 138 against which latch 136 is held by a retracting spring 139 in position to receive and support bearing 135 of clutch-opening bar 12, and with an extension 140 overlying punch-actuator 27. The arrangement is such that when the machine is at rest, *i. e.*, with clutch opening bar 12 advanced into the path of and engaged by arm 10 of the clutch, latch 136 will stand beneath bearing 135 to uphold lever 132, said latch resting against shoulder 138 on trip 137. If, now, selector 128 is advanced its trip 137 will engage with and withdraw latch 135 from beneath lever 132 and the latter will drop until arrested by contact with punch-actuator 27, whereupon bar 12 will be withdrawn from contact with arm 10 and the clutch permitted to close. As punch actuator 27 is elevated it will raise lever 132 and trip 137 until bar 12 is again projected into the path of clutch arm 10 and shoulder 138 is elevated above latch 136, which latter immediately returns to initial position ready to receive and uphold lever 132 as the punch-actuator descends, and to be reëngaged by trip 137 when actuator 128 is retracted. Thus a single revolution of shaft 1 will take place at each forward movement of selector 128, not to be repeated until said selector shall have first been retracted to reëngage latch 136.

To selector 127 is pivoted a trip 141 provided with a latch-engaging shoulder 142 similar to that on trip 137 but shorter. The purpose of this trip is to withdraw latch 136 and hold it out of the path of lever 132 so long as pressure is maintained upon selector 127, so that the shaft 1 may continue in motion for more than one revolution, to the end that a designated signal may be repeated a number of times, as when quadding out a line.

It may here be noted that each punch-bar interponent 25 as well as each stop-bar stem 87 is provided with a notch 143, and above the series of interponents 25 is arranged a locking or retaining bar 144, and above the notched portions of the stop-bar stems is arranged a similar retaining bar 145. Bars 144 and 145 are pivotally supported to move longitudinally of the punch bars, the upper bar 145 resting upon the supporting arms 146 of the lower bar 144, and the latter provided with an arm 144* resting upon lever 132. When lever 132 is supported upon latch 136 locking bars 144 and 145 will be sustained at such distance above their respective actuators as to afford a clear opening for the passage of the interponents and stop-bar stems. When, however, latch 136 is withdrawn from under lever 132 and the latter is permitted to descend until arrested by punch bar actuator 25, locking bars 144, 145, will be deposited in the notches of such of the interponents and stop-bar stems as shall have been advanced above their respective actuators to lock and hold the same in engagement until latch 136 is again interposed in the path of lever 132, to arrest the latter during the descent of actuator 25.

The punch bar, clutch and stop-bar selectors 121, 127, 128 and 123, are controlled through the medium of a suitable keyboard mechanism, preferably of the type illustrated, wherein through the intervention of permutating means any key may be placed in control of any one or more of the selectors, as will presently appear.

The keyboard mechanism shown includes a series of key levers 151 preferably separated laterally into two groups; a series of push bars 152, one for each key lever and provided with a lug 153 for engagement thereby; a series of push bars 154 arranged parallel and in the same plane with push bars 152; a special push bar 155 associated with the series 152; a third series of push bars 156, 156×, in parallel with but in a plane below series 152; and a series of transmitting bars 157 intermediate the series of push bars 154 and push bars 152 and 153 and extending transversely thereof.

The forward end of each push-bar 156 registers with one of the selectors 121, while push bar 156× registers with selectors 128, and each of said push bars 156 is furnished with a shoulder 158 in position to be engaged by a different one of the series of transmitters 157, the latter pivotally supported upon rods 159 extending transversely of the push-bars, while push bar 156× is furnished with a series of such shoulders 158, one for each transmitter 157.

At opposite ends of the series of push-

bars 156, 156ˣ, are arranged stationary bars 160 each provided with a series of shoulders 161 to receive and sustain the transmitters when the latter are retracted. The forward end of each push bar 154 registers with a different one of the series of stop-bar selectors 123, and each of said push bars is provided with a shoulder 162 in front of one of the transmitters 157. Each of the series of key operated push bars 152 is equipped with one or more shoulders 163 in position to engage one or more of the series of transmitters 157. Push bar 155 is without engaging lugs or shoulders and registers with the actuator 127 of the repeat trip 141.

It is to be noted that in the monotype machine, for which the mechanism is specially adapted, each type signal is formed by one or two perforations of which one represents space-value as well as die-case position; hence in forming each of said signals one or the other of the series of stop-bars must be projected, to measure and indicate its space-value, and at the same time the interponent or interponents representing the punches corresponding in position to the perforations of the signal must be advanced to operating position and the clutch closed to start the shaft 1 into motion.

Inasmuch as each transmitter 157 controls a separate punch and such of the transmitters as are connected to the space value group of punches each controls the stop-bar corresponding therewith, it is obvious that by a proper disposition of shoulders 163 on push bars 152 the punch or punches corresponding with any given type signal can be brought into action and its units value registered by the depression of the key appropriated to the required type.

The depression of any key connected with the series of push bars 152 will operate through the transmitter or transmitters 157 coupled therewith to advance push bar 156ˣ, thereby withdrawing latch 136 and permit a single rotation of shaft 1.

In practice each series of signals representing a complete line of composition is followed by justification signals the latter marking the ending of one and the beginning of the next line, and as each line must be of a known or predetermined length, to enable the justification fraction to be ascertained, it is obvious that unless means are provided for automatically controlling the repeat action, that is, when the key of push bar 156ˣ is depressed in conjunction with one of the type keys, there will be danger of overrunning the measure for the line unless competent means are provided for stopping the machine when the measure is full. To provide against this contingency and, incidentally, to facilitate sectional line justification for tabular matter an automatic cut-out is connected with the repeat action the same being coupled with and controlled by the units measuring mechanism, as will next be described.

The repeat trip 141 is connected by a link 165 to an arm 166 fast on shaft 167, the latter supported in bearings in frame 126 and furnished with two arms 168, 169, of which the former is on the same side of the shaft as arm 166 and is provided with an eye 170 through which passes a rod 171 depending from the outer end of the units-rack-carrier operating lever 101. Pivoted upon the hub of arm 168 is a lever 172 the outer end of which is notched, as at 173, to receive rod 171 when said lever 172 is swung beneath a bearing 174 on arm 168. A spring 175 connected to arm 166 serves to hold trip 141 down upon latch 136, and rod 171 carries an adjustable stop or nut 176 in position to engage lever 172 when the latter is swung beneath bearing 174. It will be noted that rod 171 reciprocates in unison with the cam operated lever 101 and communicates motion to arm 168 only when lever 172 is moved into engagement with bearing 174, and when this takes place during the ascent of the units-rack-carrier rock shaft 167 will be moved to shift trip 141 out of the path of latch 136 permitting the latter to swing beneath said trip and into the path of lever 132 to sustain bar 12 in position to open the clutch at the completion of the current revolution of shaft 1.

Levers 172 and 168 are coupled by a spring 177 tending to advance lever 172 toward rod 171 and the forward arm of lever 172 stands in the path of the lower or longer arm of a lever 178 pivotally supported at 179 and carrying, in its upper and shorter arm, an adjusting screw 180. Supported in guides on the frame in line with screw 180 is a slide 181 provided with shoulders 182 between which is arranged a rack bar 183 meshing with a pinion 184 on a shaft 185, the latter connected through gearing 186 with the justification-drum shaft 187. A spring 188 connected to shaft 187 operates to return and hold the drum in normal starting position at which time rack bar 183 will be in engagement with a zero abutment 189 on the frame, while the right hand shoulder 182 of slide 181 will be held in contact with said rack bar 183 by the pull of spring 223.

Supported in bearings on the frame and arranged to move laterally of rack 82 is a slide 190 provided with ways for the reception of a pick-up in the form of slide 191, the latter movable longitudinally of and in parallel with said rack 82 and provided with a retracting spring 192, a zero abutment 193, a bell trip 194, and a contact member or bearing 195 normally in the path of a stop 196 carried by rack 82, but capable of being withdrawn from said path by a move-

ment of its support 190. The pick-up member 191 is in alinement with slide 181 with which latter it engages when advanced into contact therewith by the stop 196 on the line-scale-rack 82.

Pivoted upon the frame is a pointer 197 traversing a scale 198 and provided with a pin working in a slot 199 and connected to a retracting spring 200, the latter serving to retain the pointer at one end of the scale. The operating position or lower end of pointer 197 projects into the path of pick-up 191. Pivotally attached to the frame, as at 201, is the striker or hammer 202 of a bell 203, said striker being provided with a retracting spring 204 and a shoulder 205, the latter engaging a lever 206 in rear of its pivot 201. Lever 206 engages a cam 207 on shaft 1 and is provided with a retracting spring 208 tending to advance the lever toward the cam and the striker toward the bell. To the frame is pivoted a latch 209 provided with a shoulder 210 for receiving the rear end of lever 206 when the latter is elevated by its cam 207, and said lever is also provided with a pivoted member 211 in position to be engaged by bell-trip 194 of pick-up 191.

When straight composition is being performed but a single stop 196 need be applied to rack bar 82 at a position corresponding with the measure; but when sectional justification is resorted to, that is to say, when the line measure is divided into sections and justification is applied to each, as many of these stops 196 as there are sections in the line, should be applied to said rack 82, and as accuracy of adjustment is a great desideratum, special means have been devised for the purpose. Thus, in the example illustrated, the rack bar is provided with an undercut groove 212 on one side and a series of parallel teeth or ridges 213 on the other, said teeth being disposed at an angle or diagonally to the length of said rack. The stop is formed in two sections, a body section 214 provided with a projection 215 riding in groove 202, and a clamping and contact section 216. The two sections are connected by a clamping screw 217, and the engaging section 216 is provided with teeth meshing with the teeth 213 of the rack 82 and is movable in guides on the body section by means of an adjusting screw 218, the latter supported to turn in bearings on said body section and to engage a threaded portion of contact section 216. By loosening screw 217 the stop can be shifted longitudinally of bar 82, and after being engaged with the latter, contact section 216 can be moved transversely of bar 82 upon body section 215 to effect its final adjustment through the medium of screw 218 and diagonally disposed teeth 213.

Each push bar of the series 154 controlling the stop-bars engages one of a series of feelers in the form of levers 220 mounted in a frame 229 detachably secured to the keyboard frame and corresponding in lateral dimensions and arrangement with the series of stop-bars; that is to say, the right hand lever of the series represents the largest type, the one to the left thereof the next largest type, and so on, the lever at the left of the series representing the smallest type.

Pivotally supported above and in proximity to the series of feelers 220 is a frame 221 extending longitudinally of said series of feelers and provided with ways for the reception of a movable abutment, represented by slide 222, the latter maintained in contact with lever 178 by a retracting spring 223. Abutment slide 122 is normally supported to move longitudinally in a path to one side and out of range of feelers 220, as by the engagement of arm 166 with a stop $166^{\times}$ on the frame, but when lever 172 is swung above and into the path of stop 176 on rod 171, as it may be while the units-rack is in engagement with the units-wheel, the withdrawal of the units-rack at the conclusion of its admeasuring movement, will turn shaft 167 in a direction to move frame 221 and thereby cause the line of movement of abutment slide 222 to intersect the lines of movement of feelers 221.

The operation of the automatic cut-out and connected mechanism described is as follows: With the parts in their normal or starting position rack 183 is against stop 189; pick-up 195 is against zero stop 193; lever 172 is retracted from rod 171; lever 178 is retracted against slide 181; abutment 222 is out of line with feelers 220; and bell hammer 202 is held elevated by the engagement of latch 209. The interval between the left hand end of slide 181 and pick-up 195 represents the justification area (*i. e.*, the maximum amount that the justification devices of the casting machine can add to one or any predetermined number of spaces contained in the line, to fill the latter) less the interval between the left hand shoulder 182 and rack 183 and the setting of the stop or stops 196 corresponds with the measure of the line, or of the justifiable sections thereof in the event sectional line justification is to be performed.

As the keys are manipulated to produce the proper series of signals representing the matter to be recorded, line-scale-rack bar 82 is advanced during the formation of each signal a distance proportional to the space value of said signal as measured by the stop-bars, and at the same time the feeler corresponding with the space-value of the signal is elevated as each signal is produced.

When the justification area is reached during the composing action stop 196 engages pick-up 191 so that if composition is pro-

ceeded with beyond this point motion will be communicated to latch 209 to release hammer 202 and permit the same to be actuated by cam 207 at each revolution of shaft 1, thereby giving notice to the operator that he is within the justification area. It is optional now with the compositor to produce the justification signals and thus close the line, or to proceed further with the composition. If he concludes to close the line, he presses key 225 of the return or resetting mechanism whereupon the indicator drum mechanism is operated to move rack 183 until slide 181 contacts with pick-up 191, the amount of motion thus permitted the drum being in direct proportion to and indicating the deficiency of the line. It should be noted, in this connection, that resetting key 225 is provided with a rack 226 meshing with a pinion 227 on the justification drum shaft 187, the arrangement being such that when said key is pressed the indicator drum will be rotated until arrested by the contact of slide 181 with pick-up 191. If, however, composition is continued within the justification area until pick-up 191 engages slide 181, any further movement beyond that point will advance said slide and cause it to displace the upper end of lever 178, whereupon abutment 222 and lever 172 will be advanced, the one toward feelers 220 and the other toward rod 171.

The interval between the left hand shoulder 182 of slide 181 and rack 183 in relation to the motion of lever 178 at the point of contact with abutment slide 222, is proportional to the sum of the space values represented by the series of feelers 220, consequently, as slide 181 is advanced it will move abutment 222 to successively cover such of the series of feelers 220 as are connected to push bars 154 representing type of a width in excess of the space value indicated at the time by the interval between slide 181 and the end of the line, the latter represented by rack 183.

Coincident with the described movement of abutment slide 222, lever 172 will be advanced to engage stop 176 and shift said abutment slide laterally toward feelers 220. As, however, said lateral displacement takes place as the unit rack is retracted subsequent to formation of the signal whose recordation effected said movement, the abutment slide, although already in the advanced position to which it has been moved during the recording of said signal, hence opposite the series of feelers will or will not enter the paths of said feelers accordingly as the projected feeler represents a space value less or more than the unoccupied fraction of the line measure, for if the value of the feeler at the time projected is just equal to or less than the line deficiency it will stand beyond and clear of the abutment slide and will not interfere with its lateral movement and if its space value is in excess of the line deficiency it will be engaged by the abutment slide and thus for the time being arrest the lateral movement. Immediately, however, the projected feeler is retracted, the lateral movement of the abutment slide will be completed and said slide held so that its line of motion will intersect that of the feelers. The abutment slide will now stand opposite and in the paths of such of the feelers as represent space values in excess of the line deficiency and will prevent the formation of signals of excess space value while permitting those of lower value, thus preventing accidental overrunning of the measure.

If, when line-scale-rack 82 enters the justification area, the repeat action is in operation the cut-out devices just described would be ineffective, inasmuch as the feeler 220 corresponding with the space value of the repeat signal would stand projected and prevent the lateral movement of the abutment slide necessary to bring it into operative position. It is to avoid this that lever 172 is coupled with the repeat trip 141.

The parts are so adjusted that lever 172 will engage stop 176 when the interval between slide 181 and rack 183 corresponds with the space value of the largest type, consequently as slide 181 passes that point during the formation of the last permissible signal for the line, lever 172 will be moved by its spring into position above stop 176, and as the units-rack carrier is elevated at the conclusion of the signal-forming operation lever 168 will be elevated to turn shaft 167 in a direction to lift trip 141 from engagement with latch 136 allowing the latter to retract and cause the opening of the clutch at the conclusion of the revolution of shaft 1 during which said last permissible signal is produced.

The point in the travel of slide 181 at which the latch 141 is coupled with the units-rack-carrier is an arbitrary one, and the measure of the largest type is adopted to prevent accidental overrunning, for should a smaller measure be adopted it would be possible to terminate the line with a signal whose width was in excess of the existing deficiency. For example, if the measure of the widest type was, say nineteen units, and the mechanism was so adjusted that lever 172 would be thrown into engagement with its actuating member 176 when slide 181 was seventeen units distant from the end of the line (represented by rack 183) and if the last previous signal advanced slide 181 to a point eighteen units removed from rack 183, it would be possible to add a nineteen unit signal before the

withdrawal of the trip would take place, with the result that the line would exceed the measure by two units. According to the preferred arrangement, however, with the engaging point of lever 172 located just nineteen units distant from rack 183 any signal within the capacity of the machine could be formed before latch 141 would be withdrawn. So, too, if the last signal carried slide 181 beyond the predetermined point of nineteen units and into the closing area it would automatically arrest the repeat action, leaving the unoccupied fraction of the measure to be filled by justification, or by the manipulation of the keys; but in such case the abutment 222 would be in position to discriminate between signals of less or greater space value than the indicated deficiency of the line, permitting only such of the signals to be formed as fell within the line of deficiency.

When the lines are divided into justifiable sections, for tabular matter, the line-scale-rack 82 is equipped with two or more of the adjustable stops 196, each of the latter marking one terminal of the section represented thereby; and to enable these stops to be brought successively into operative relation with pick-up 191, it is only required that the support for said pick-up should be retracted after the signals for each section, save the last, have been completed. For this purpose slide 190 is provided with an actuating lever 230 and a retracting spring 231, the latter operating to retain the pick-up in the path of stops 196; and to facilitate the return of rack 82 the rear faces of stops 196 and engaging shoulder 195, one or both, are beveled, as at 232, so that as the rack is retracted the pick-up will be automatically displaced.

The pointer 80, coöperating with justification drum 79 in the usual manner, is mounted upon a rack bar 234, the latter supported to reciprocate in guides 235 parallel with the axis of said drum. Engaging the teeth of rack bar 234 are the driving and holding pawls 236, 237, the latter pivoted on the frame and the former carried by one arm of a lever 238 pivotally supported, as at 239, and having its other arm connected by a link 240 to a lever 241. The rear end of lever 241 is coupled with the punch bar 24 pertaining to the justification space signal producing punch, so that each time a justification space signal is produced the pointer will be advanced one unit and there held by holding pawl 237. The advance movement of pawl 236 is limited by a stop 242 which forces said pawl into engagement with the rack, to prevent overthrow, and the tail of holding pawl 237 projected over the tail of driving pawl 236 so that when said pawl 237 is tilted to withdraw it from engagement with rack 234, the driving pawl will at the same time be retracted to release the rack and permit the latter to be returned to initial position by gravity or otherwise.

A machine constructed and operating as thus far described would be incompetent to compose successive series of signals representing lines of composition unless provided with means for restoring the parts to initial position after the completion of each series, or at an intermediate stage should it be desired or required to interrupt the formation of a line before its completion. Such mechanism has been provided and will now be described.

Connected through gears 243 with the constantly running shaft 3 is a shaft 244 provided with a friction wheel 245, and on the shaft 83 of the units-wheel is secured a similar friction-wheel 246. Pivotally supported on the frame by bolt 247 is a lever 248 the outer end of which is connected by a link 249 to a bell crank 250, one arm whereof extends down and engages lever 98 between the latter and the units wheel. Link 249 is supported upon one arm of a lever 255 the other arm whereof is connected to the resetting key 254 the latter provided with a shoulder $255^{\times}$ engaging the frame. Suspended by a link 251 from lever 248 intermediate its fulcrum and point of attachment to link 249 is a friction wheel 252 the latter operating, when lever 248 is elevated, to engage wheels 245 and 246 and reverse the motion of the units wheel. Transmitting wheel 252 is normally held from engagement with wheels 245, 246, by its weight and that of lever 248, the latter operating to tilt connecting link 249 upon lever 255 but restrained from so doing by the engagement of bell crank 250 with holding pawl lever 98, under which circumstances the point of attachment of link 249 to bell crank 250 will stand slightly below the pivot of the latter, so that when link 249 is elevated by pressure upon key 254 to bring transmitting wheel 252 into working engagement with wheels 245, 246, bell crank 250 will be operated to engage lever 98 and effect the withdrawal of holding pawl 76, and inasmuch as at this time the units-rack is out of contact with the units-wheel, the latter is free to respond to the resetting devices and will run back until the line scale rack 82 encounters and is arrested by the usual adjustable line stop 253.

The return of pointer 80 to zero position, either at the closing of a line or of a justifiable section thereof is accomplished through the medium of a special key 256 as follows: Pivoted to the frame at 257 is a lever 258 one arm whereof is connected by a link 259 to the holding pawl 237 of the drum pointer 80, and by a link 260 to the pick-up

slide-actuating lever 230, while the other arm of said lever is provided with a retracting spring 261 and is engaged by one arm of a lever 262 pivoted on the frame and having its other arm connected to said resetting-key. By pressing in said key 256 lever 258 is actuated to withdraw pick-up 191 from the path of the stop 196 on rack bar 82, and to withdraw actuating and holding pawls 236, 237 from engagement with rack bar 234, thereby permitting the index pointer 80 to return to zero position, but also permitting the pick-up (if at the time advanced by the engagement of a stop 196) to be retracted by its spring 192 to zero position against its abutment 193.

It is sometimes required, for special reasons, to set the units wheel and connected parts forward or back one or more units and to aid in performing such adjustments a scale 263 and coöperating pointer 264 are provided, the latter carried by a shaft 265 to which is secured a pinion 266 meshing with the units wheel.

Pointer 197 coöperating with scale 198 affords a ready means for effecting accurate adjustment of stops 196 on rack bar 82 and under special conditions, as when the stops are not applied for working sectional line justification, said pointer and scale may be utilized to indicate the fractional setting to be applied to the units wheel.

Having thus described our invention and in what manner the same is to be performed, what we claim as new and desire to secure by Letters Patent, is:—

1. In a pattern composing machine the combination of the following elements, to wit; a series of key-controlled punches; a units-measuring and registering mechanism provided with units-wheel, units rack and holding pawl; and an actuating mechanism for the selected punch or punches and the units-rack, the same including a driven member coupled with the punch actuator and units rack to reciprocate both and to alternately connect and disconnect the units-rack and units wheel.

2. In a pattern composing machine the combination of the following elements, to wit; a series of key-controlled punches; a units-measuring and registering mechanism provided with a units-wheel, a units-rack and a series of key-controlled stop-bars; and an actuating mechanism for said punches and units-rack, the same including a driven shaft, transmitting devices for the punch actuator, transmitting devices for reciprocating the units-rack, and transmitting devices for periodically engaging the units-rack and units-wheel, said transmitting devices being coupled with and deriving motion from said driven shaft.

3. In a pattern composing machine the combination of the following elements, to wit; a series of key-controlled punches and an actuator therefor; a units-measuring and registering mechanism provided with a units-wheel, a units-rack, a holding pawl, means for alternately engaging the units-rack and holding pawl with the units-wheel, and a series of stop-bars for the units rack; and an actuating mechanism for said punches units-rack and holding pawl, the same including a driven shaft and transmitting devices intermediate said shaft and the punch actuator, the units-rack, and the units-rack and holding pawl shifting devices.

4. In a pattern composing machine provided with a series of key-controlled punches, an actuator therefor, and a units-measuring and recording mechanism, the latter including a units-wheel, a reciprocatory units-rack, and means for alternately coupling and uncoupling the units-rack and units-wheel, and in combination therewith, an actuating mechanism for said punch actuator and units-rack, the same including driving and driven members coupled through a one-revolution key-controlled clutch, and transmitting devices intermediate said driven member and the punch actuator, the units-rack and the units-rack and units-wheel coupling and uncoupling means.

5. In a pattern composing machine provided with a series of key-controlled punches, a paper feed mechanism and a units-measuring mechanism, the latter including units-wheel, units-rack, holding pawl and key controlled stop-bars, and in combination therewith, actuating mechanism for said punches, feed mechanism, stop-bars and units-rack, the same including a driven shaft with transmitting devices intermediate the latter and the punch and stop-bar actuators, the feed mechanism and the units-rack, a running driving member, and a key-controlled one-revolution clutch intermediate said driving member and driven shaft.

6. In a pattern composing machine provided with a series of key-controlled punches, an actuator therefor, and a units-registering mechanism including a units-wheel, a holding pawl, a longitudinally reciprocatory units rack, mounted in a laterally movable carrier, means for shifting said carrier and holding pawl to effect alternate engagement with the units wheel, a series of stop bars for the units-rack, and an actuator for said stop bars, and in combination therewith, an actuating mechanism including a running driving member, a driven shaft, a one revolution key-controlled clutch intermediate said running member and driven shaft, and transmitting devices for the punch and stop bar actuators, and the units-rack and its carrier controlled by cams on said driven shaft.

7. In a pattern composing machine the

combination of the following elements, to wit; a series of punch-bars; an actuator therefor; a series of key-controlled interponents, one for each punch-bar; a shaft coupled with a prime mover through a one revolution clutch, with transmitting means intermediate said shaft and the punch-actuator; and controlling devices for said clutch, including a clutch opening member engaged by a part moving in unison with the punch actuator, a retaining latch, and a trip for said latch coupled with a part moving in unison with the punch actuator.

8. In a pattern composing machine provided with a perforating mechanism including a series of punch-bars, an actuator therefor, and a series of key controlled interponents, one for each punch-bar, and in combination therewith, a driving mechanism including the following elements, to wit; a driving shaft; transmitting devices intermediate said shaft and the punch actuator; a prime mover coupled with said driving shaft through a self-closing one-revolution clutch; clutch actuating devices engaged by the punch-actuator to open the clutch; a latch for retaining said clutch actuating devices in operating position; and a trip under the control of the several interponent keys and operating to withdraw the latch and in so doing advance into the path of the punch actuator, to release the latch and permit its return into position to reëngage the clutch actuating devices as the latter are restored to position by the punch actuator.

9. In a pattern composing machine the combination with a punching mechanism comprising a series of punch bars, an actuator and a series of key controlled interponents, of a driving mechanism the same including a running driving member, a driven member coupled with the punch actuator, a one-revolution clutch, a clutch operating member, a latch, a key-controlled trip projecting into the path of the punch actuator and engaging the latch to withdraw the latter and permit the closing of the clutch, and a second-key controlled trip in position to engage said latch and operate the latter, said last named trip being located out of the range of action of the punch actuator.

10. In a pattern composing machine the combination of the following elements, to wit; a series of key controlled punches deriving motion from a running driving member through a one revolution clutch, the latter controlled by the individual punch keys through a clutch operating member; a latch; a trip coupled with said keys and disengaged at each revolution of the clutch; and a repeat action including an actuating key controlling a trip, the latter engaging the latch to maintain the same in retracted position.

11. In a pattern composing machine such as described, and in combination with the series of key-controlled punches provided with an actuator deriving motion from a running driver through a one-revolution self-closing clutch, the latter provided with an opening member, a stop movable into and out of the path of said clutch-opening member, actuating means for said stop including a member lying in the path of the punch actuator and operating to positively advance said stop into engaging position during the forward or punching movement of said punch actuator, a latch engaging the stop actuating devices to hold said stop in advanced position, and a plurality of trips engaging said latch to release the stop and permit its withdrawal from the clutch opening member, one of said latches being controlled by the punch controlling keys and engaged by the punch actuator, while the other latch is controlled by a special key and is not acted upon by the punch actuator.

12. In a pattern composing machine the combination of the following elements, to wit; a punching mechanism including a series of key-controlled punches; a paper feed mechanism; a units measuring mechanism including a series of key-controlled stop-bars; a driving mechanism including a running driving member, a one-revolution clutch, and a driven shaft the latter coupled with and transmitting motion to said punching, feeding and units-measuring mechanisms; clutch operating devices including a clutch engaging member, a latch, and a trip, the latter moved by the punch selecting keys to retract the latch and engaged by the punching mechanism to release said latch; and a repeat mechanism including a key-controlled trip engaging the latch to hold the latter in retracted position relatively to the clutch engaging member.

13. In a pattern composing machine provided with a series of key controlled punches, a units measuring mechanism, and actuating devices deriving motion from a running driver through a one revolution clutch controlled by the punch selecting keys, and in combination therewith, a repeat action including means for suspending the action of the clutch opening devices, and means for automatically releasing the repeat action when the measure is filled.

14. In a pattern composing machine provided with a series of key-controlled punches, a units measuring mechanism, and an actuating mechanism deriving motion from a running driver through a one-revolution clutch controlled by the punch selecting keys, and in combination therewith, a repeat action including means for holding the normal clutch opening devices out of action, and means under the control of the

units measuring devices and operating upon said clutch opening devices to automatically return the latter to active position when the said units measuring devices indicate the full measure.

15. In a key controlled pattern composing machine provided with a series of punches, a units-measuring mechanism and a running driver coupled with the punching and units measuring mechanisms through a one-revolution clutch provided with clutch opening means under the control of punch selecting keys, and in combination therewith, a repeat action including means for temporarily suspending the action of the clutch-opening devices and means controlled by the units measuring mechanism for automatically releasing the repeat action and restoring the clutch opening devices to active position.

16. In a key controlled pattern composing machine equipped with a series of punches, a units measuring mechanism, and actuating devices including a running driver, a one-revolution clutch, and a series of punch selecting keys connected to the clutch actuating devices in a manner to first close the clutch and then set its opening devices, and in combination therewith, a repeat action coupled with the clutch actuating devices to close the clutch and temporarily suspend the action of its opening devices, and means controlled by the units measuring mechanism and coupled with said clutch actuating devices to automatically open the clutch when the registered units equal the measure of the line.

17. In a key controlled pattern composing machine provided with a series of punches, a units measuring mechanism, and actuating means deriving motion from a running driver through a one-revolution clutch, and in combination therewith, the following elements, to wit; clutch operating devices automatically brought to opening position during each revolution of the clutch; a latch for retaining said clutch operating devices in open position; a trip controlled by the punch selecting keys and engaging the latch and a moving part of the driven mechanism to release the clutch operating devices and permit their return to closed position; a second trip engaging the latch to hold it temporarily removed from the clutch operating devices; and means for automatically uncoupling said last named trip from the latch when the line is filled, the same including means under the control of the units measuring mechanism for coupling said trip to a moving part of the machine.

18. In a key controlled pattern composing machine deriving motion from a running prime mover through a one-revolution clutch and provided with a units measuring mechanism, and a repeat action for temporarily suspending the closing of the clutch, and in combination therewith, an automatic cut-out for the repeat action coupled with and controlled by the units measuring mechanism.

19. In a pattern composing machine the combination of the following elements, to wit; a series of punches; a units measuring mechanism; a one-revolution driving clutch; a series of punch selecting and clutch controlling keys; a repeat action for suspending the opening of the clutch; and a cut out for said repeat action controlled by the units measuring mechanism to open the clutch.

20. In a pattern composing machine, the combination of the following elements, to wit; a punching mechanism including a series of punches, a one-revolution driving clutch and a series of punch selectors controlling said clutch; a units measuring mechanism provided with admeasuring means controlled by the punch selectors; a repeat action for suspending the periodical opening of the clutch; and a cut out for said repeat action including actuating devices and means controlled by the units measuring mechanism for coupling said actuating devices with a driven member of the machine.

21. In a pattern composing machine the combination of the following elements, to wit; a punching mechanism including a series of punches, a one-revolution driving clutch, and a series of punch selectors controlling said clutch; a units-measuring mechanism including a units-wheel, a units rack, admeasuring devices selectively controlled by the punch selectors, and actuating devices for said units rack deriving motion from the clutch; a repeat-action for temporarily suspending the clutch opening devices; and a cut-out for said repeat action including actuating devices and means controlled by the units-measuring mechanism for coupling said cut-out and units-rack actuating devices together to automatically suspend the repeat action and arrest the clutch at the end of its current rotation.

22. In a pattern composing machine provided with a key-controlled punching mechanism, a units measuring mechanism including a units-wheel and a longitudinally reciprocating and laterally movable units-rack operating in conjunction with controllable admeasuring devices to advance said units wheel, and actuating devices for said mechanisms driven through a one revolution clutch whose opening means are controlled by the punch selecting devices, and in combination therewith, a repeat-action coupled with the clutch opening means to hold the latter out of action, a line measuring member coupled to move in unison with the units-wheel when engaged by the units-rack, transmitting devices including a separable coupling intermediate the units-rack actuating devices and the repeat-action, and means

controlled by said line-measuring member and acting upon said separable coupling to close the latter as the line measuring member approaches the end of the line.

23. In a pattern composing machine, the combination of the following elements, to wit; a units-wheel; a line measuring member coupled to move in unison with said units-wheel; a reciprocatory units-rack supported in a units-rack carrier; controllable devices for admeasuring the reciprocatory movements of the units-rack when in engagement with the units-wheel, and actuating devices for the units-rack and its carrier including a one-revolution driving clutch.

24. In a pattern composing machine the combination of the following elements, to wit; a key controlled punching mechanism provided with a one-revolution driving clutch; a units-measuring mechanism including key controlled admeasuring members, a units wheel with connected line measuring member, a reciprocatory units-rack mounted upon a movable carrier, and actuating devices for the units rack and its carrier deriving motion from the clutch of the punching mechanism; a repeat action controlling the opening member of the one revolution clutch; and a cut-out for said repeat action the same including an actuating member moving in unison with the units-rack carrier, transmitting devices connected to the repeat action and provided with a detachable coupling for engaging said actuating member, and a controlling lever intermediate said coupling and the line measuring member, and acted upon by the latter to close said coupling.

25. In a pattern composing machine the combination of the following elements, to wit; a punching mechanism including a series of punches, a one-revolution driving clutch, and a series of punch selecting keys coupled with the clutch opening devices; a units measuring mechanism including a longitudinally reciprocating units-rack mounted upon a laterally movable carrier, a series of admeasuring stops the latter coupled with and selectively controlled by certain of the punch selecting keys, actuating devices for the units rack and its carrier deriving motion through the clutch of the punching mechanism, and a units-wheel engaged by the units rack and coupled with a line measuring member; a series of feelers each connected to one of the series of punch selecting keys controlling the units-rack admeasuring stops; a movable abutment traversing a path intersecting those of the feelers; and means controlled by the line measuring member for positioning said abutment relatively to the feelers.

26. In a pattern composing machine the combination of the following elements, to wit; a punching mechanism provided with a series of punches and controlling keys therefor; a units-measuring mechanism provided with a series of admeasuring stops controlled by certain of the punch keys, and a line measuring member; an abutment slide under control of the line measuring member; and a plurality of feelers serially arranged longitudinally of said abutment slide with their paths intersecting that of said abutment slide, and each coupled to move in unison with a different one of the series of admeasuring stop controlling keys.

27. In a pattern composing machine the combination of the following elements, to wit; a punching mechanism provided with a series of punches, a one-revolution driving clutch and a series of punch-selecting and clutch-controlling keys; a units measuring mechanism receiving motion through the clutch of the punching mechanism and provided with admeasuring devices controlled by certain of the punch selecting keys, and with a line measuring member; a repeat-action controlling the clutch; a plurality of feelers each coupled to move in unison with one of the series of keys pertaining to said admeasuring devices; an abutment slide movable longitudinally of the series of feelers; means for connecting the repeat action with a moving part of the machine; and transmitting devices engaged by the line measuring member and acting upon the abutment slide and repeat action connection to advance the one and retract or cut out the other.

28. In a pattern composing machine provided with a series of key controlled punches and a units measuring mechanism including a line measuring member and movable chart or indicator, and in combination therewith the following elements, to wit; a stop connected to move in unison with the line measuring member; an engaging member coupled to move with the chart in opposition to said stop; and a pick-up interposed between said stop and chart member and movable laterally of the path of said stop.

29. In a pattern composing mechanism provided with a series of key controlled punches and a units measuring mechanism operating in conjunction with certain of said punches including a line measuring member and a movable chart or indicator, and in combination therewith, a stop carried by the line measuring member, an opposing movable member coupled to move in unison with the chart or indicator, a pick-up interposed between said stop and the opposing chart or indicator members, and means for withdrawing said pick-up from the path of the stop, to permit the passing of the latter.

30. In a pattern composing machine and in combination with the key-controlled punching and units measuring mechanism

thereof including a line measuring member and an opposed movable member coupled with the chart or indicator, a pick-up interposed between the movable chart member and an adjustable stop coupled with the line measuring member, a movable support for said pick-up, and means for shifting said support to carry the pick-up into or out of the path of the stop.

31. In a pattern composing machine provided with key controlled punching mechanism and power driven paper feed mechanism, of a winding roll, a ratchet wheel, two spring actuated pawls engaging said ratchet wheel, and means deriving motion from the paper feed driving mechanism for retracting said pawls in alternation.

32. In a pattern composing machine provided with key-controlled power driven punching mechanism, and in combination therewith, a winding roll, a ratchet wheel, two spring actuated pawls engaging said ratchet wheel, and actuating devices for retracting said pawls in alternation.

33. In a pattern composing machine, provided with a paper feed mechanism and a key controlled punching mechanism, and in combination therewith, a winding spool, a ratchet wheel, two pawls engaging said ratchet wheel to advance the latter in one and the same direction, and actuating devices for said pawls including two actuating bars coupled with said pawls to advance the latter in the same direction by movements of said bars in relatively opposite directions, a spring connecting said actuating bars, and a reciprocating member of the paper feed mechanism engaging alternate actuating bars to retract the latter and the connected pawls.

34. In a pattern composing machine provided with key controlled punching and units measuring mechanisms deriving motion from a running driver through a one revolution clutch, and in combination therewith, restoring or resetting means for the units measuring mechanism the same including a running driving member and controllable coupling devices.

35. In a pattern composing machine the combination of the following elements, to wit; a punching mechanism provided with a series of key controlled punches; a units measuring mechanism including units-wheel, units-rack and holding pawl; actuating mechanism for the punches and units-rack coupled with a running driver through a key-controlled clutch; and a resetting or restoring mechanism for the units-wheel including a friction drive intermediate said running driver and units-wheel, and controllable means for bringing the same into action.

36. In a pattern composing machine provided with a key-controlled punching mechanism and a units measuring mechanism including a units-wheel to which admeasuring movements are transmitted through a units-rack coupled with a running driver through a one-revolution clutch, and in combination therewith, a resetting or restoring mechanism including a frictional driving mechanism intermediate the running driver and units-wheel, and controllable means for coupling up said frictional driving mechanism with the units-wheel.

37. In a pattern composing machine the combination of the following elements, to wit; a key-controlled punching mechanism including a running driver and a clutch; a units measuring mechanism including a units-wheel, a holding pawl, a units-rack driven through said clutch, and means for alternately engaging the units-rack and holding pawl with the units-wheel; a friction drive for the units wheel, and resetting or restoring devices acting upon the holding pawl and friction drive to couple the one with and uncouple the other from the units-wheel.

38. In a pattern composing machine the combination of the following elements, to wit; a key controlled punching mechanism provided with actuating devices deriving motion from a running driver; a units measuring mechanism; a movable indicator; a pick-up intermediate said indicator and units measuring mechanism; a pointer for said indicator provided with an intermittent feed mechanism; and controllable means for disconnecting the pointer from its feeding devices and the pick-up from the units measuring mechanism.

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