

Oct. 4, 1932.

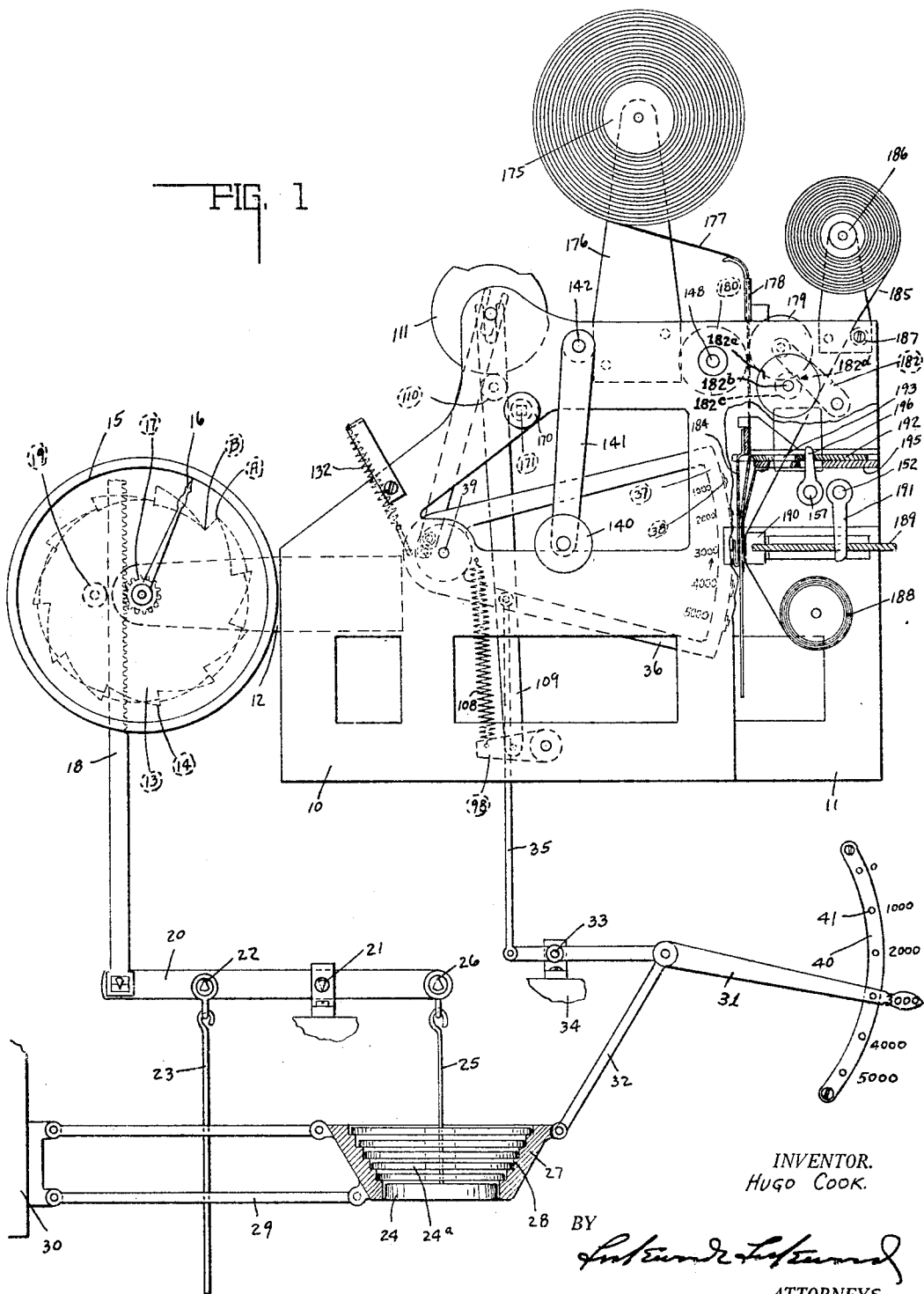
H. COOK

1,880,314

WEIGHT PRINTING ATTACHMENT FOR SCALES

Filed May 7, 1925

4 Sheets-Sheet 1



Oct. 4, 1932.

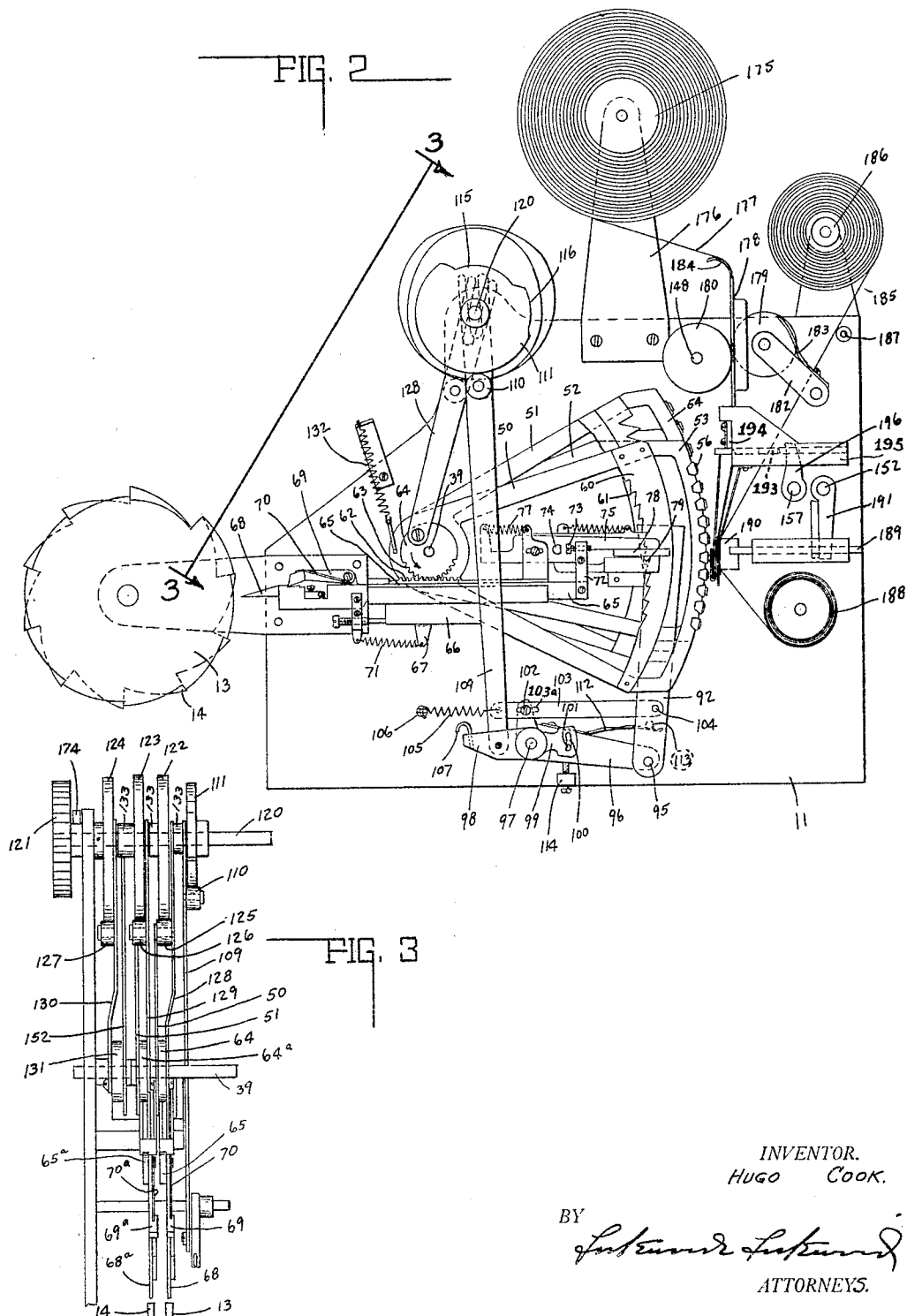
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4 Sheets-Sheet 2



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4 Sheets-Sheet 3

FIG. 4

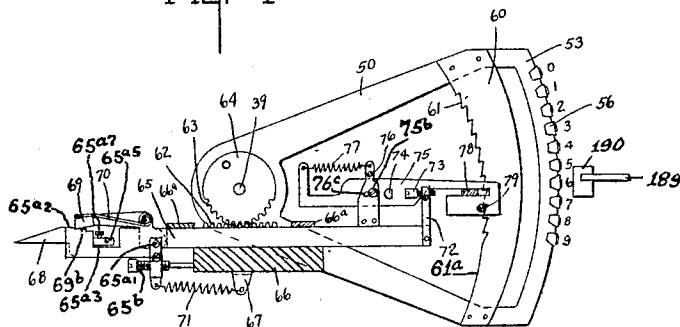


FIG. 5

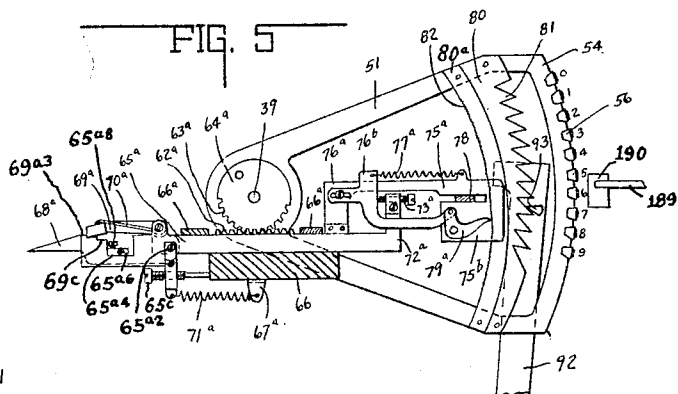


FIG. 7

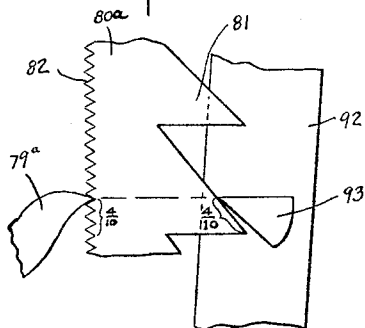
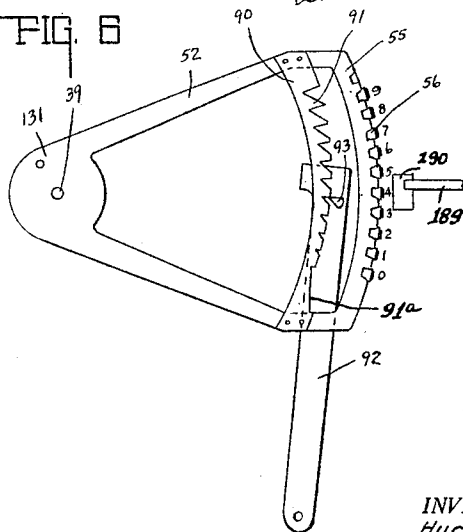


FIG. 6



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Oct. 4, 1932.

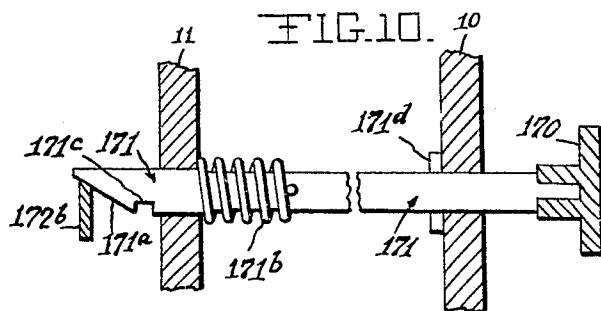
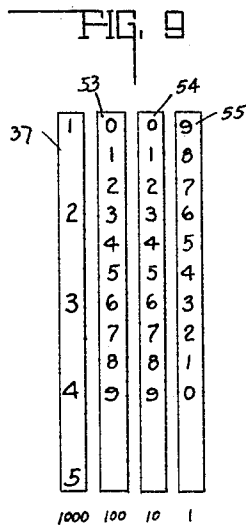
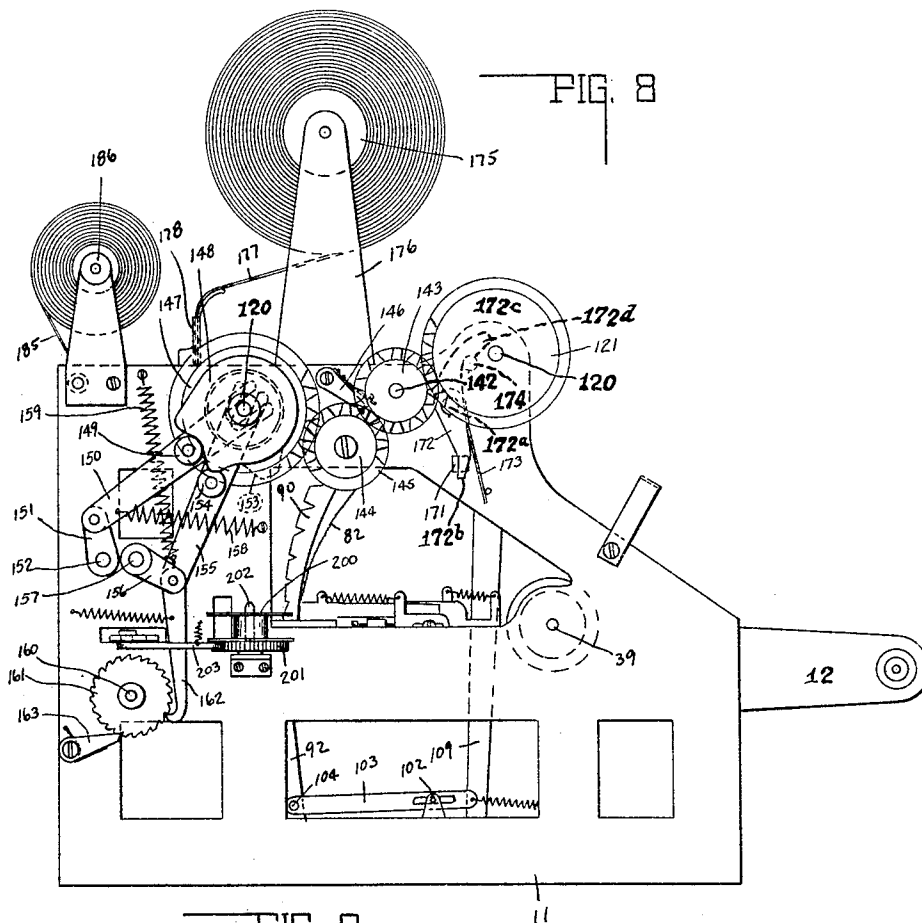
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WEIGHT PRINTING ATTACHMENT FOR SCALES

Filed May 7, 1925

4 Sheets-Sheet 4



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WEIGHT PRINTING ATTACHMENT FOR SCALES

Application filed May 7, 1925. Serial No. 28,629.

My invention relates to a method of and apparatus for operatively controlling more ponderous mechanism by any instrument of precision, or like means, and which is too delicate or sensitive to itself operate or control the operation of the same, such as scales more particularly of the automatic type, electric and other meters, and other apparatus usually where great accuracy, reliability and freedom from human error may be required.

Heretofore, many attempts have been made to accomplish the same, but they have failed to commercially and usefully accomplish the same due to the fact that a high order of skill is required in the design and construction of the present instruments of precision such that they may perform their present minimum functions with such frictionless accuracy as to comply with the requirements of uniform sensitive-honesty long established by commerce and the penal laws, and that the operation or control of any further mechanism thereby, however frictionlessly the same may be made, has heretofore always entrenched upon such requirements and rendered the whole apparatus highly unreliable and worse than useless.

The prime object of this invention is to provide such novel method and apparatus as will not practically impair the sensitivity of the selected precision instrument by its control of the operation of other mechanism proportionate thereto, or to a function thereof, however ponderous said other mechanism may be, and whereby said other mechanism may evidence by its said controlled operation any desired function or functions of said precision instrument with the same uniform dependable accuracy substantially as possessed by said instrument when employed alone.

To attain these and other objects, and in accordance with the general features of this unitary and related invention, said new and useful method broadly contemplates the inclusion of the steps of associating an instrument of precision and more ponderous mechanism desired to be operated in proportion thereto, or to a function thereof, in co-operative relation; associating a control means with said instrument so as to be operated

thereby in proportion thereto, or to a function thereof; employing said instrument preferably in its usual manner and which employment will proportionately operate or influence said control means; operating said more ponderous mechanism independent of said instrument and with as much force as may be necessary; and controlling the extent of said last stated operation by the physical contact with said control means of part of said mechanism, and which said contact is of such delicacy and brevity as not to practically impair the sensitivity of said precision instrument. Other steps, and incidental qualifications of the aforesaid steps, of my said method will amply appear herein-after and in the claims.

To demonstrate the practical utility of my said method, a related, improved and novel apparatus embodying my unitary invention, and which may be advantageously and economically employed in practicing my said method with uniform great accuracy and reliability as a unitary invention, is provided by me to also serve as an example, to those skilled in the art, of the facility with which, after becoming familiar with my invention, the forms and kinds of existing apparatus, with or without substantial modification, may be employed in the efficient practice of my said method in like or kindred production. And from said example and this specification it will be apparent to those skilled in the art that my novel method may be practiced by many forms of apparatus, other than herein shown and specifically described, selected in proper units and cooperative association with relatively slight change or addition.

The foregoing and other objects of my invention will be more apparent from the following considerations of its functions from the novel apparatus aspect of my invention.

My present invention relates broadly to means for measuring, indicating or recording degrees of movement, or equivalent values, of instruments of precision or devices where the force required to move such means directly by such instrument or device would

detract from the precision of the result and render the same commercially inaccurate.

In such apparatus anything which is not commercially accurate and precise is worse than useless and promotive of obliquity and fraud.

More specifically my invention relates to weighing scales, or other mechanism, of such sensitiveness as to preclude its direct operation of the means for measuring, indicating or recording, which may be evidenced either by the relative movement of type members and their printing point, or indicating members and their point of indication, or other recording members and their recording point; and an indication may be achieved either directly or indirectly by means of a printed ticket for instance; all as convenience may require and the experience of one skilled in the art may employ after becoming familiar with my invention.

In my invention the primary or weighing or like sensitive mechanism is wholly independent of the indicating, recording or other mechanism, but said primary mechanism operates one or more control members, and I provide mechanical means independent of said primary means for driving said indicating, recording or other mechanism and disconnecting or arresting the same at variable points in the movement of said driving means, said variable points being determined by said one or more control members by such sensitive mechanical means that the precision of the primary mechanism may not be detracted from in any practical degree.

In the past it has been endeavored to move control members by the weighing scale and to cause said members to be impinged by, and to resist or bear, the operating thrust or force required to move the indicating or recording mechanism corresponding to the position of said members, but the same has always been impractical and inaccurate owing to the main facts that the required force of said impingement substantially disturbs the weighing scale and renders commercially inaccurate the whole result as well as each component element thereof; and further that the necessary state of all instruments of precision is that of sensitive unrest, and the required force of such impingement precludes such sensitive unrest, and when, as frequently happens, that something is added to, or is taken from, or falls off, the scale platform during the weighing period, the result is not only highly inaccurate but the mechanism is liable to be severely strained or broken.

I have attained the requisite commercial practical and accurate results in such mechanical means by operating the indicating or recording means independent of said weighing or primary means, and by providing the said operating means with one or more hair-triggers adapted to delicately

touch a control member or members operated by the scale or primary mechanism to trip and release said indicating or recording means from further movement, or to be arrested in their travel, at the point accurately indicating or recording to the sensitive result of said weighing or primary mechanism at the instant of tripping of said one or more hair-triggers. The delicacy and sensitiveness of the contact of said one or more hair-triggers on said control member or members is such that neither the normal sensitive unrest of the scale or primary mechanism, nor the accuracy of the result be interfered with, nor the mechanism be liable to being strained or broken by anything being added to or taken or falling from the scale during the indicating or recording movement, as in either of the latter cases the hair-trigger is tripped at a known wrong point and the operating means must be reoperated before the true result will be recorded.

In the preferred form of my invention I employ a plurality of said control members and hair-triggers, one for each of the unitary or component parts of the indicating, recording or analogous mechanism, so that each may be tripped or released in a different position whenever required to indicate or record the true result. Simultaneously with the releasing or tripping of each of said hair-triggers I provide means for temporarily locking each indicating or recording means in the position attained at the time of the releasing or tripping its corresponding hair-trigger, so that the true figures or result may be evidenced without liability to change. I also provide means for properly aligning the true figures or characters evidencing the true result, so that in such alignment of such figures or characters on the several members no liability to error may occur in their indication or recording.

Some portions of the foregoing general result have been heretofore striven for by employing electrical circuits and other electrical apparatus, but the same was so liable to undisclosed current and other failures and uncertainties that the same were impractical commercially in instruments of precision and the same never attained more than a laboratory test.

In the form on my invention which experience has indicated to be preferable for the most satisfactory attainment of commercially practical results under the conditions I have met most generally in practice, I provide the independent operating means with a definite movement at each operation; and I divide such movement into two cycles, or portions of such movement, each of a definite and uniform extent of such movement at each operation. The first of said cycles being that period of the movement of said operating means in which first, the detail strip is

printed with the amount of the present indication, and then the indicating, recording or like members are returned to zero or initial position; while in said second cycle said indicating, recording or like members are set to evidence the true result of the present operation determined by said hair-triggers tripped by said control member or members movable proportionate to the scale or instrument of precision. The hair-triggers are so releasable in any of the many different portions of movement of said operating means throughout its second cycle, and thus for the uniform movement of the driving or operating means a variable movement is imparted to the indicating, recording or like member or members, and said variable movement is proportionate to the movement of the control member or members.

A further object of the invention is to provide a mechanism of the character above described of simplified and compact form which will operate for recording weights or other data, within a wide range with comparative accuracy. Thus weights of a fraction of a pound may be printed, as well as weights to the extent of several thousand pounds.

This invention is also applicable to devices other than scales, wherein it is desired to record certain data which is effected by a part of the device being moved to a given position in the same manner that a scale will be brought to a given position upon being operated for weighing purposes.

Other features of the invention will become apparent from the following disclosure in the drawings and specification as pertaining to the structural features of the mechanism and their cooperation.

The full nature of the invention will be understood from the accompanying drawings and the following description and claims:

In the drawings, Figure 1 is a side elevation of the machine without its case or cabinet and showing it attached to the portion of a scale and illustrating the connection therewith of an auxiliary printing segment. Fig. 2 is a side elevation of the machine showing the side frame removed therefrom. Fig. 3 is a view taken on the line 3—3 of Fig. 2. Fig. 4 is a side elevation showing the printing segment for the hundreds with the actuating mechanism therefor. Fig. 5 is the same as Fig. 4, showing the printing segment for the tens, with the actuating mechanism therefor. Fig. 6 is the printing segment for the ones. Fig. 7 is an enlarged view of a portion of the segment shown in Fig. 5. Fig. 8 is a side elevation of the opposite side of the machine from that shown in Fig. 1. Fig. 9 is a diagrammatical illustration showing the respective figures on the printing

faces of the several segments. Fig. 10 shows a detail of the locking device.

In the drawings there is shown a machine comprising the side frame 10 mounted on the operating side thereof and the side frame 11 mounted on the opposite side or the side embodying the driving mechanism. At the front of the machine there is provided an outwardly extending arm 12 extending forwardly from said machine having pivotally mounted thereon a stepped down disk 13 and a second ratchet tooth disk 14. It will be noted that the stepped down disk 13 is provided with a substantially spiral periphery, its periphery being stepped down from the point A to the point B, there being provided ten of such steps representing ten digits for numerical purposes. The disk 14 retains the same average diameter, and is provided with ten ratchet teeth of equal length and depth, being distinguished from the disk 13 in this respect.

As shown herein the disks 13 and 14 are associated with the face 15 of the scale having a hand 16 for indicating the weight on the drum or face 15, said drum being stationary and the hand 16 being rotatably mounted in connection with said disks at the center thereof. A pinion 17 is associated with the hand 16 and said disks in position to be engaged and actuated by a rack bar 18, said rack bar being held in position by a roller 19. The disks 13 and 14, as well as the hand 16 and pinion 17 are keyed upon the same shaft or connected in any other suitable manner so as to rotate in unison. The rack bar 18 is engaged and actuated by a beam 20 of the scale, said beam being fulcrumed at 21, and supporting upon a suitable knife edge 22 a rod 23 which supports the usual scale platform. On the other side of the fulcrum 21 the counterbalance support 24 is supported by a rod 25 from the knife edge 26. Thus it will be observed that upon the actuation of the scale, the disks 13 and 14 will be caused to rotate with the hand or pointer 16. In order that a wide range of weights may be recorded, there is provided a counterbalance weight supporting rack 27 having a plurality of annular step-like seats 28 in which the weights 24a are adapted to rest and be supported directly over the support 25. Said rack is supported by the rods 29 arranged as a parallelogram and connected with a support 30, forming a part of the case, cabinet or framework, whereby the rack 27, when lowered or elevated, will move in a vertical plane. The rack 27 is lowered or elevated by a handle 31 through the medium of a link 32, said handle being fulcrumed at 33, on a suitable support 34 forming part of the case, cabinet or framework. Connected with the handle 31 on the other side of the fulcrum 32 there is a connecting rod 35 pivotally connecting a printing seg-

ment or member 36, said segment or member having an arcuate face 37 upon which is provided the type 38, said type being in the form of blocks indicating such figures, for instance, as 1, 2, 3, 4 and 5. As shown here-
 5 in there are five sets of blocks equally spaced apart. At the center of curvature of the arcuate face 37 a pin is pivoted as at 39 to the frame 10 so as to be moved up and down
 10 about the pivotal support 39 through the medium of the rod 35 by the operation of the lever 31. Adjacent the handle of the lever 31 there is an indicating plate 40 having a plurality of notches 41 adapted to be
 15 engaged by the handle, said notches being indicated by numerals corresponding to those upon the arcuate face 37.

This portion of the machine operates independently of the automatically actuated
 20 printing members and is employed in addition thereto when the weight on the scale reaches a high figure and is counterbalanced by the counterbalance weights 24a. In other words, it is not controlled by the rotary
 25 movement of the drum actuated direct from the beam of the scale, as is the case with the other printing segments which will hereinafter be more fully described. It will be observed that when the weight of the ordi-
 30 nary scale, for purposes of illustration, exceeds 1,000 pounds, the usual practice is to add a counterbalance weight 24a, representing 1000 pounds. This may be done in this instance by bringing the handle from the
 35 zero mark to that indicating 1000, and thus lower the supporting rack 27 until the lowermost counterbalance weight 24a rests upon the weight support 24. Thus a 1000 pound counterbalance weight will be added to the
 40 scale, and at the same time, the printing segment 36 will be brought to a position to print the numeral 1, indicating 1000 pounds. Upon lowering the handle to the 4000 pound mark, the lowermost four counterbalance
 45 weights 24a will be applied to the scale and the numeral 4 (indicating 4000 pounds printed by the segment which will accordingly be moved to that position.

As shown in Fig. 2, there is a plurality of
 50 printing segments 50, 51 and 52, each of them pivoted at 39 and having arcuate printing faces 53, 54 and 55, respectively, the pivotal mounting 39 of the respective segments being at the center of curvature of their re-
 55 spective printing faces. On each of the printing faces there is provided type 56, ten on each face, representing the digits zero to nine for printing purposes, as will hereafter be described.

It will be explained that in printing a given weight up to "999", the position of the seg-
 60 ments about the pivotal mounting 39 must be controlled by the movement or position of the disks 13 and 14, which are rotated to-
 65 gether with the pointer 16 by the movement

of the scale beam. On the other hand, weights registering above 1000 will bring into play the printing segment 36 independently of said disks and controlled exclusively by the handle 31 and the counterbalance weights.

Considering now the printing segment 50, as shown in Figs. 2, 3 and 4, it will be noted that the type form the figures "0" to "9", inclusive, beginning at the top of the segment and ending with the numeral "9" at the bot-
 70 tom. Intermediate the printing face 53 there is an arcuate plate 60 having a plurality of ratchet teeth 61 formed on an arc eccentric to the pivotal mounting 39. Associated with the segment 50 and cooperating therewith, there is a rack bar 62 slidable in the frame and the teeth of which mesh with a pinion 63 formed partially about a disk 64, said disk forming a part of the segment and being rigidly secured thereto. It will be seen, there-
 75 fore, that upon the pivotal movement of the segment 50, the rack bar 62 will be moved back and forth. Adjacent said rack bar and slidable along the side thereof there is a similar latching bar 65 which is positioned im-
 80 mediately in front of the rack bar 62 so that the greater portion thereof is hidden therefrom as shown in Figs. 2 and 4. Both of said bars are slidably mounted upon a fixed block 66, which is supported by the frame and provided with an ear 67. The bar 65 has pivoted on one end thereof a forwardly projecting and preferably pointed hair-trigger 68 which is so positioned as to engage the periphery of the disk 13. On the rack bar 62 there is provided a pawl 69 which is
 85 spring-pressed by a spring 70 and adapted to engage in a suitable notch 69b on the bar 65.

This arrangement is such that upon the rotation of the gear 64 or the elevation of the segment 50, the rack and pinion action will move the bar 62 rearwardly until the pawl 69 engages in the notch 69b provided for that purpose in the bar 65. Thereupon the reverse or downward movement of the segment will act through the medium of the rack-bar 62 and its pawl 69 to move the bar 65 forwardly until the trigger 68 lightly touches the periphery of the disk 13, which said touching will trip the pawl 69 and cause the bar 65 to be released and quickly move rearwardly through the action of the spring 71 until said bar 65 comes to its tripped position of rest with its adjusting screw 65b in contact with fixed block 66. The bar 65 is provided with an upwardly extending post 72 having a stop screw 73 mounted thereon in position to engage and arrest a stop-projection 74 mounted on a latch bar 75. The rack bar 62 is also provided with a post 76 upon which the latch bar 75 is slidably mounted and which is connected thereto by a spring 77 which normally holds stop-projection 74 in contact with stop-screw 73 to thereby nor-
 100 mally maintain said latch bar 75 with its pin
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79 a uniform distance out of latching engagement with the ratchet teeth 61. The forward end of the latch bar is slidably supported upon a fixed plate 78 which is grooved to receive and guide the forward end thereof as well as extend through a slot in said bar below which is provided a pin 79 for engaging said ratchet teeth 61.

Near the beginning of each operation of handle 140 the segment 50 is caused, by means hereinafter described, to move upwardly to zero or normal position. Said upward movement, through gear 64 meshing with the teeth of rack-bar 62, causes said bar 62, with its post 76 carrying latch-bar 75, to move rearwardly until stop-pin 74 engages adjustable stop-screw 73, during which movement pin 79 ratchets in and out of teeth 61, which moves bar 75 longitudinally with its slot 75c slidably supported by stud-screw 75b.

Toward the latter part of said upward movement of segment 50 said pin 79 rides upon the smooth surface 61a of plate 60 to enable the downward motion of segment 50 to be commenced without liability of its being locked therefrom by pin 79 engaging, for instance, in the lowermost tooth 61 in the initial portion of the next upward movement of segment 50 before it has moved to the extent necessary to position pin 79 a clearance distance from teeth 61. The whole inner edge of bar 60, comprising teeth 61 and surface 61a, is eccentric to shaft 39, to the extent of the longitudinal movement of bars 62, 65 and 75, whereby pin 79, at all points throughout the relative movement of segment 50 and pin 79, is maintained at a uniform clearance distance from each tooth 61 to insure its engagement with the proper tooth 61 selected by the tripping of hair-trigger 68.

The adjustment of stop-screw 73 enables compensation for variance, in wear or in manufacture, to be made respecting the clearance between pin 79 and teeth 61; while stop-screw 65b affords like adjustment of the clearance between the shoulder of notch 69b and the nose of pawl 69 at the rearmost positions of bars 62 and 65.

As segment 50 moves downward, bars 62 and 65, connected by pawl 69, move forward causing the stop screw 73 to engage the stop 74 and move the latch bar 75 forwardly simultaneously with the other two bars, and thus maintaining the pin 79 from engagement with the ratchet teeth 61. As before stated, the general curvature of the ratchet tooth edge of the arcuate plate 60 is eccentric so as to follow the forwardly moving pin 79, wherefore said pin will remain in close proximity with the ratchet teeth at all times. Immediately upon the point of the hair-trigger 68 lightly engaging the peripheral edge of the disk 13, the pawl 69 will be tripped and the bar 65 will be moved back-

wards by the tension of spring 71 until its stop-screw 65b comes in contact with the fixed block 66, in which position said bar 65 is in its tripped position of rest. Simultaneously with said tripping of hair-trigger 68 the ratchet-bar 75 is drawn rearward in slot 76c by spring 77 until its pin 79 engages in the proper tooth 61 to lock segment 50 in the correct position to enable the proper result to be printed or indicated. It will be observed that the particular ratchet tooth which would be engaged would depend upon the speed at which springs 71 and 77 move their respective bars 65 and 75 to position the segment arresting pin 79 and by the position of the segment 50 when the trigger 68 engages the disk 13, and that is in turn determined by the position of the disk 13 which varies in diameter, which is controlled by the weight on the scale. Accordingly, assuming that the digits on the segment represent hundreds and a 500 pound article is placed on the scale, the disk 13 will be rotated thereby to such a position that the engagement of the periphery thereof by the latch 68 will cause the 500 mark ratchet tooth on the segment to be engaged and hold the segment in position to print the numeral "5". The means for returning the segment to starting position after the operation thereof, will be hereinafter described with respect to the other segments as well.

Referring now to the segment 51, as best shown in Fig. 5, it will be noted that the arcuate plate 80 is provided with the ratchet teeth 81, positioned upon the outer edge thereof and in an arc having its center of radius at 39. The inner edge of the plate is provided with a plurality of teeth 82 and has its radius of curvature eccentric to 39. The teeth 82 are so sized as to provide ten of such teeth to one tooth 81. This segment 51 is the tens of pounds member and is constructed, in itself and with its co-operating parts, similar to that above described for segment 50, and as follows:—Attached to segment 51 is a disk 64a having pinion teeth 63a adapted to engage the teeth of the rack bar 62a which is slidably mounted together with the bar 65a on the fixed block 66, which is provided with an ear 67a and slidably held thereon by the fixed plates 66a. The rack bar 62a is provided with a pawl 69a and the bar 65a is provided with a trigger finger 68a, and is moved rearwardly by a spring 71a upon the trigger 68a engaging the periphery of the disk 14. Mounted upon the rear of the bar 62a is a post 76a on which is pivotally mounted a latch support 75a, said latch support extending into a slot in the plate 78 and said plate 78 extending through a slot in said latch support, separating the upper portion from the lower portion 75b, while the rear end of said bar 75a is also held in lateral posi-

tion by a slot in the rear edge of said plate 78 (Figs. 5 and 2). Pivotaly mounted on the post 76a, there is a latch member 76b connected by a spring 77a to the support 75a.

5 The lower portion of said latch member 76b is pivoted to a dog 79a which in turn is fulcrumed to the portion 75b of the support 75a in position to engage the teeth 82 upon the inner edge of plate 80a. The bar 65a is
10 provided with the upwardly extending portion 72a having a stop screw 73a so positioned as to engage and stop the rearward movement of the latch member 76b.

With respect to this mechanism, as above
15 observed in connection with the segment 50, upon the segment 51 being drawn upward in setting the machine, the rack bar 62a will be drawn rearwardly until the pawl 69a drops into notch 69c on the bar 65a where it is
20 pressed down by a spring 70a. Upon further operation of the machine, as the segment 51 is lowered, the forward movement imparted to the rack bar 65a will move the hair-trigger 68a and the bar 65a forwardly until said
25 hair-trigger engages the periphery of the disk 14. The position of the bars at such engagement will be varied, depending upon the rotary position of said disk as controlled by the scale in the manner above described.
30 By reason of the eccentric curvature of the ratchet teeth of said disk, the radius thereof will be varied at a given point throughout the length of each tooth. Accordingly, the trigger finger will be tripped at some period
35 during the downward movement of the segment 51 and will so act as to cause the dog 79a to bear against and engage the teeth 82 and arrest the further movement of the segment. This is accomplished through the dis-
40 engagement of the ratchet bar 76b by the stop screw 73a so as to permit the spring 77a to actuate the same for operating the dog.

Considering now the segment 52, as shown in Fig. 6, it is provided with an arcuate plate
45 90 having a plurality of ratchet teeth 91 on the rearward edge thereof. As will be observed herein, all but the top one of said teeth are cut off to an increasing extent toward the lower part of the plate.

50 By means which will be hereinafter described with respect to all three segments, the segment 52 is raised upwardly simultaneously with the others, but in descending is timed to move after segment 51 has reached the
55 limit of its downward movement. Upon the segment 51 being tripped and locked in position by the dog 79a, an arm 92, extending between segment 51 and 52, will be actuated to cause a dog 93, extending from opposite
60 sides of said arm 92, to engage between a pair of the ratchet teeth 81. The arm 92 is so arranged that it will be engaged at some point intermediate the projecting and crotch portion of one of the teeth 81, depending
65 upon the position at which said teeth are

stopped by the dog 79a engaging a tooth 82, as shown in Fig. 7. This will depend upon the particular teeth 82 between which the dog 79a engages. As there are ten of the teeth 82 to one of the teeth 81, should the dog 79a en-
70 gage in the fourth tooth 82, then the dog 93 will extend only four tenths of the depth of the engaged tooth 81. Now considering the segment 52 in connection with this action of the dog 93, it will be observed that the lateral
75 position of the pin will be determined by the particular tooth 82 which is engaged by the dog 79a. In turn, this lateral position of the dog 93 will determine which of the teeth 91 will catch thereon in the downward move-
80 ment of the segment 52. As shown in Fig. 7, since the tooth 91 extends inwardly of the teeth 81 only four tenths of the distance, it will be engaged by the fourth tooth 91. The segment 52 will accordingly be arrested at
85 this point, which will print the numeral "4".

It will be observed from the above that while the segment 50 is controlled by one disk having ten different radii so that the particular numeral from "0" to "9" will be pre-
90 sented for printing, depending upon which radius of the disk 13 is presented, and accordingly print the hundreds, the segment 51 will print divisions of the hundreds, or tens by its being actuated through the medium of the
95 disk 14. With respect to the ones, as printed by the segment 52, they will be determined through the arrangement just described with respect to the dog 93, or through the exact
100 positioning of the segment 51 through the medium of the engagement of the teeth 82 by the dog 79a, and the particular radius of the disk 14 where the trigger finger 68a en-
105 gages. While the action of the mechanism controlling segment 50 properly aligns the type thereon, and the positive engagement of the teeth 91 by the dog 93 on the segment
110 52 positively aligns the type thereon, means is provided, which will hereinafter be described, for aligning the type of the segment 51 after it has functioned to position the segment 52. That mechanism will now be described.

As shown in Fig. 2, the arm 92 is pivoted at 95 to the free end of an arm 96 which in
115 turn is pivoted to a shaft 97 which is supported between the frames. An arm 98 is keyed on the shaft 97 and a bell crank lever 99 is likewise keyed to the shaft 97. Said bell crank lever is provided with a slot
120 at one end in which a pin 101, protruding from the arm 96, is adapted to slide. The other end of the bell crank lever 99 is provided with a screw pin 102 adapted to slide in a suitable longitudinal slot 103a provided
125 in an arm 103, said arm having one end pivotally connected at 104 to the arm 92, while the other end is connected by a spring 105 with a pin 106 mounted on the frame. Therefore, said spring has a tendency through the arm
130

103 to draw the lever 92 to the left and cause the dog 93 to engage in the teeth 81 and 91. The arm 98 has one end connected through a hook 107 with a spring 108, which is not
 5 shown in Fig. 2, but is shown in Fig. 1 connected with the frame. Furthermore, said arm 98 is pivotally connected with a rod 109 which extends upwardly and is provided with a roller 110 adapted to be engaged and actuated by a cam 111 against the tension of said
 10 spring 108. Mounted on the arm 96 is a leaf spring 112 adapted to engage under a pin 113 fixedly mounted on the frame so as to normally exert a downward pressure on said
 15 arm 96. The downward movement thereof is limited by a stop 114.

The action involved in this mechanism is such that as the cam 111 is rotated, in the manner hereinafter described, and as the roller 110 rides in the relieved portion 115 thereof, the spring 108 will cause the arm 96 to be moved downwardly so that, through bell crank 99, the screw 102 will move forwardly in its slot 103a, thereby moving the bar 103
 20 to the right against the tension of the spring 105 and thus hold the arm 92 and its dog 93 out of engagement with the teeth 81 and 91 on the segments 51 and 52. As the cam 111 continues to revolve until the roller 110 engages the relieved portion 116, the position of the bell crank lever 99 will be changed so as to permit the dog 93 to register with the teeth 91 as above described, arresting the
 25 downward movement of the segment 52. Upon the roller 110 reaching the outer portion of the cam 111, the arm 98 will be forced downwardly by the rod 109 so as to raise the end 99 of the bell crank against the pin 101, which will in turn raise the arms 96 and 92
 30 so as to move the dog 93 upwardly whereby it can seat in the crotch between the teeth 81 and slightly elevate the segment 51 so as to bring the type on the respective segments into alignment for printing purposes.

The several segments are raised and lowered through the medium of a plurality of cams, connecting rods and associated springs, as will now be described. As shown in Figs. 2 and 3, a shaft 120 is pivotally mounted
 35 in the frame and caused to rotate by a driving pinion 121, Fig. 8. Keyed on said shaft so as to rotate therewith and with the pinion 121, in addition to the cam 111, there are cams 122, 123 and 124. Said last-mentioned cams are adapted to be engaged by
 40 the rollers 125, 126 and 127, respectively, said rollers being pivotally mounted on the rods 128, 129 and 130, respectively. Said rods are each pivotally connected to the disks
 45 64, 64a and 131, respectively, which are rigidly secured concentric to segments 50, 51 and 52, respectively. Each of said segments are connected to the frame by individual springs 132, as shown in Figs. 1 and
 50 2, whereby the tension of the springs nor-

mally tend to maintain them in their lowered position against the action of the cams. The arms 109, 128, 129 and 130 are bifurcated, as shown in Figs. 1 and 2, at their upper ends so as to embrace the shaft 120
 55 for maintaining them in proper alignment, said arms and cams being spaced from each other by a plurality of spacing sleeves 133. It will be apparent from the foregoing, that upon the rotation of the cams which are
 60 properly formed and timed with respect to each other, their engagement with their respective rollers will move the respective rods downwardly so as to elevate the members or segments 50, 51 and 52 to starting or normal position as heretofore severally described. Thereafter, upon the cams releasing the rollers, the springs 132 will tend to cause said members or segments 50, 51 and
 65 52 to be gradually lowered, but said lowering thereof being controlled by said rollers respectively in contact with the relief on the cams. The lowering of said segments will continue through the medium of the springs until they are arrested in a given
 70 position by the trip mechanism above described. Said springs 132 hold segment 50 with its engaged tooth 61 against pin 79, as well as holds segment 51 with its engaged serration 82 against the point of locking dog
 75 79a, during the remainder of the cycle of operating lever 141, to insure the firm locking of said segments in their said arrested positions. The locking pin 79 and dog 79a are not carried by, nor operated directly by
 80 their respective bars 65 and 65a for the reason that said bars have a substantial movement when released which might tend to produce a recoil of said bars and their attached
 85 parts, or parts directly operated thereby, which recoil might tend to momentarily disengage said pin 79 or dog 79a, or both, from their proper notch or serration and thus tend to produce an inaccurate indication or printing. Said pin 79 being mounted upon member
 90 75 independent of bar 65 and moved into engagement with its correct tooth 61 upon the initial portion of the released movement of said bar 61, by the separation of members 73 and 74, quickens the engagement of said
 95 pin 79 and tooth 61 and prevents recoil and other tendencies toward inaccuracy of the result. The same is true of dog 79a and its bar 65a and their associated parts.

The arrangement of the notches 61, 81, 91 and the serrations 82, uniform radial divisions apart and slightly eccentric upon their respective segments 50, 51, and 52, (or in other words said relative eccentricity of the cooperating faces of said toothed members and their respective detents) greatly facilitates the accuracy with which their respective segments may be arrested and locked until the completion of the indicating or
 100 printing period, as well as greatly reduces

the liability to inaccuracy, breakage and wear.

To divide into ten, or other, spaces the difference in eccentricity between the first and last notch, or serration, on each segment, and arranging said notches concentric, would require great accuracy and smallness of notches and locking pins, with consequent great liability to inaccuracy, breakage and wear. My invention, in this respect, obviates this by making said notches relatively large and disposed upon a relatively large part of their respective indicators or segments, but to mount each of said notches or serrations slightly different distances progressively from the axis of each of their respective indicators or segments so that their locking pins or dogs are only required to have a relatively small movement to lock or unlock, and so that the more extensive or faster the indicator or segment may be moved the closer will the locking pins or dog progressively come to the tooth into which each of said pins or dog may be locked, thus enabling a quicker and more accurate locking proportionate to the extent or speed of movement of the member to be locked.

This greatly facilitates great accuracy in operation, and obviates fineness of construction of the working parts as well as any inaccuracy from wear. The cams are so timed, and particularly the cam 124, that the lowering of the segment 52 will commence after segment 51 has completed its movement and been arrested by dog 79a engaging a notch or tooth 82, predetermined as heretofore described by hair-trigger 68a.

During the return to normal movement of segments 51 and 52 said dog 93 is held out of engagement with teeth 81 and 91, so that when said segments are returned to normal, or their uppermost, position the sharp edge of dog 93 is held away from contact with said surface 91a of plate 90, and said edge of dog 93 does not contact with said surface 91a except when the other end of said dog 93 enters the whole depth of any tooth 81 of segment 51, whereupon said edge of dog 93 is substantially in contact with said surface 91a at a point the space of one tooth 91 below the first or lowermost tooth 91, and in a position to engage therein, in said instance, when segment 52 is moved downward by its spring 132 at the rate controlled by its cam 124.

In order to indicate or print, in such instance, with the mechanism detailed in the drawings, the amount or value of said one tenth of the whole movement of segment 52, as well as that of any other portion of the movement of said segment, the printing or indicating characters on said segment 52 must be arranged in the reverse order, so that, in said instance, for said one tenth downward movement of said segment 52 the character

"O" will be caused to appear at the printing or indicating point.

In the instance heretofore described, the lowest portions of each cam surface of disks 13 and 14 and the higher portions thereof represent higher values; but if such arbitrary arrangement be reversed, as may be done by anyone skilled in the art without departure from the spirit or principles of my invention, it will be obvious to those skilled in the art that in such reversal the order of arrangement of the characters on said segments 50 and 51 will be reversed, yet the arrangement of the characters on segment 52 will remain the same due to the face that segment 52 is not arrested by anything but the position of dog 93 in any tooth 81 on segment 51.

The bottoms of all teeth 81 and 91 are concentric with their respective segments 51 and 52, so that in the indication or type aligning movement, heretofore described, of said dog 93 the latter finds a uniform seat in the bottom of one tooth in each set of teeth 81 and 91.

When indicating higher characters than "O" on segment 52, the initial position of the sharp edge of dog 93, at the commencement of the downward movement of said segment 52, is not so close to said surface 91a, and is held a distance therefrom corresponding to the greater height of that portion of a tooth 81 or segment 51 at which said dog 93 comes to rest. Furthermore, it will be noted that the movement of the cam and spring actuated rods, through their connection with the segments, will move the racks 62 and 62a back and forth through the movement of the disks 64 and 64a.

With respect to the driving mechanism, there is provided a manually actuated handle 140 having a crank 141 pinned to a shaft 142 extending through the frame and connected on the other side thereof with a pinion 143, meshing with gear 121 keyed on said shaft 120 for actuating the same as above described, and also engages and meshes with an idler pinion 144 which is freely mounted on the frame in connection with a ratchet wheel 145 adapted to be engaged by a pawl 146. Fig. 8, so as to prevent rotation of the mechanism in the wrong direction. Said function of pawl 146 prevents any backward movement of the operating lever 141, and the parts driven thereby, which might, and no doubt would, raise the indicating or printing portions of each or any of said segments, after the downward movement thereof had been arrested by their respective stop pins, and thus cause an incorrect indication or printing which it is highly essential to avoid in all instruments of precision. The idler pinion 144 meshes with a gear 147 which is connected with and rotates a cam 148 engaged by a roller 149 mounted on a link 150, which is pivotally connected with a crank

151 keyed to a shaft 152, which extends through the machine, as will be hereinafter described for operating the printing mechanism. On the other side of the gear 147 there is a cam 153 which acts upon a roller 154 mounted on a link 155 pivoted to a crank 156, which is keyed to a shaft 157, and extends through the frame for actuating the paper cutting knife. The roller 149 is maintained against the cam 148 through the medium of a spring 158, and the roller 154 is maintained against its cam by a spring 159. Keyed to a shaft 160 is a ratchet wheel 161 which is rotated a notch at a time by the movement of a pawl 162 pivotally connected to the link 155 so that upon the rotation of the cam 153, the ratchet wheel 161 will be rotated to the extent of one tooth and held in position by a pawl 163. The shaft 160 extends through the frame for receiving a winding drum for winding up a paper record strip as will be hereinafter described. Also mounted on the operating side of the machine, as shown in Fig. 1, there is a locking button 170, mounted on a square plunger 171 extending through the frame to the opposite side, as shown in Fig. 8. The end of the plunger 171 is beveled so as to engage a spring-pressed pawl 172 for forcing it out of locking position when the plunger 171 is pushed forward by the operator against a suitable spring, not shown herein. The pawl 172, when held in normal position by a spring 173 is adapted to engage a projection 174 on the shaft 120 adjacent the pinion 121, as shown in Fig. 3 and in dotted lines in Fig. 8. Therefore, before the machine can be operated or the handle 140 turned, the operator must release the mechanism by pressing inwardly the plunger button 170. This is to lock the mechanism and permit of its being unlocked by a single push of the plunger, followed immediately by a partial rotation of the handle, after which the plunger may be released. Pawl 172 is pivoted on fulcrumed pin 172—*a* near its center. The lower end, 172—*b* of pawl 172 rests upon the bevelled end 171—*a* of plunger 171, (Figs. 8 and 10), and is held in said position by said spring 173. When plunger 171 is pressed inward the lower end 172—*b* of pawl 172 rides upon said bevelled end 171—*a* and, in the instance shown in Fig. 8 is moved to the right, which correspondingly moves the upper end of pawl 172 to the left in the instance shown in Fig. 8 in dotted lines, thus moving the shoulder 172—*c* on the upper end of said pawl 172 out of the path of said stop-projection 174, thus permitting the handle 141 to be operated one cycle until it is again stopped by stop-pin 174 again coming in contact with the shoulder 172—*c* of pawl 172. At the high end of bevel 171*a* of plunger 171 is a notch 171*c* into which end 172*b* of pawl 172 drops to temporarily hold plunger

171 in its depressed position, with shoulder 172*c* of pawl 172 out of stopping engagement with stop pin 174. Upon the movement of handle 141 (Fig. 1) said pin 174 comes in contact with the inclined surface 172*d*, which, in the further rotation of handle 141, still further moves toward the left, in Fig. 8, the upper end of said pawl 172 and releases lower end 172*b* of pawl 172 from said notch 171*c*, and thus releases plunger 171 to be returned to normal position by its spring 171*b*, which holds said plunger in said position with its pin 171*d* against the frame 10 (Fig. 10). From the time of the engagement of the locking pins or dogs with the teeth of their respective indicators or segments, the driving handle 141 and its connected parts become disengaged from further driving of said respective segments during the remainder of the cycle of operation of said handle 141.

The printed strip may be in the form of the usual tickets, such as employed in connection with cash registers and the like, which are originally in strip form and rolled upon a reel 175, said reel being supported by a bracket 176. The strip of ticket paper 177 is received in a suitable guide 178 and fed to the machine through the rollers 179 and 180 (Fig. 2). The feed roller 180 is mounted on a shaft 181, driven by the gear 147 (Fig. 8). Said roller may be provided with suitable dating mechanism (not shown herein) so as to date the tickets as they are printed. The roller 179 is merely a pressure roller mounted upon an arm 182 and held tightly against the feed roller 180 by a suitable spring member 183. The strip is fed through a metal guide plate 184 in position to be engaged by the type on the several segments. A recording or detail strip 185 is mounted on a roll 186 and carried over a suitable roller 187 to a point adjacent the printing position of the ticket 177. Thereafter the recording or detail strip is rolled on a spool 188 which is mounted on the shaft 160, (Fig. 8), and driven by the ratchet wheel 161.

Slidably mounted between the side frames of the machine, is a sliding impression plate 189 (Fig. 2) adapted to slide forward and force the paper and printing ribbon against the type on the segments under pressure. The forward edge of said plate is provided with a block 190 for pressing the paper against the type. Said plate 189 is actuated by an arm 191, the end of which engages in a suitable opening or slot in the plate 189, wherefore, upon the movement of the arm through the shaft 152 and cam 148, the plate and printing block 190 will press the paper strip against the type so as to print the same. Mounted above the plate 189 is a cutter 192, which is provided with an opening 193 through which the paper strip 185 may pass without being cut. The forward edge of

the cutter 192 coacts with cutter 194 for cutting the strip 177 at that point. The cutter 192 is slidably mounted upon a fixed supporting plate 195 and is actuated by an arm 196 through the medium of the shaft 157, which in turn is actuated by a cam 153. From the foregoing, it will be observed that the cams and mechanism are so timed as to feed the paper strips into printing position while the segments are being moved upwardly to begin the operation and reach their proper position for being printed upon the segments being brought to printing position and aligned. Thereupon, the printing block 190 and the cutter 192 are operated for making a first printed impression upon the ticket strip 177, cutting the strip, and permitting the same to drop from the machine upon the recession of the printing block 190, and thereafter making a second impression on the recording strip 185. The data or recording strip is not severed, but wound up on the spool 188 so as to preserve a permanent record of the weights. As before mentioned, a suitable means for printing the date may be employed, such as substituting the usual type of dating roll for the feeding roll 180.

The printing by the type on the paper strips is accomplished through the medium of a single carbon ribbon, such as used on typewriters or the like, said ribbon being wound upon a spool 200 mounted on the outside of the frame and extending horizontally from one side of the frame to the other, it being wound from the opposite side upon said spool, the horizontal position of said ribbon being directly in line with the pressing block 190. The spool 200 is rotated through the means of a ratchet wheel 201 mounted upon a spindle 202, said ratchet wheel being actuated by a pawl 203 controlled by the movement of the pressing plate 189 so that upon the return movement of said pressing plate, after the impression has been made, the pawl 203 will be actuated to slightly turn the spool 200 and wind the ribbon thereon by slight step by step movements.

From the foregoing description of the mechanism and the cooperation thereof as described in connection with each part of the machine, it will be obvious that after the scale has been brought to weight-indicating position, the operator need only press in the button 170 so as to release the locked mechanism, and give the handle 140 two rotations after which a printed ticket will drop from the machine having the weight printed thereon. The weight may be printed to any amount. If the scale is such as to weigh articles of more than 1000 pounds, it will print the weight to a single pound. The same is true of articles weighing anything from one pound up. If it is desired to record a smaller weight, the numerals printed may be in deci-

mals or fractions of pounds, depending upon the adjustment of the scale. The machine as shown herein will print four digits. While the mechanism of the machine has been herein described in detail, it is obvious that various parts thereof may be altered or varied in many ways, without departing from the invention as hereinafter claimed.

It will be noted that the printing mechanism is so designed as to be capable of printing on both the ticket strip 177 and the permanent recording strip 185 through the medium of a single printing ribbon. This is due to the fact that after one impression is made by the movement of the block 190 against the type, said impression being first made upon the ticket strip 177, thereafter said strip is cut and discharged from the machine so that the recording strip 185 is presented to the printing surface of the ribbon. Thereafter, a second impression will be made due to the action of the two projecting portions on the cam 148.

If it should be desired that no tickets be printed, but that the record strip 185 only be printed, any suitable means such as a cam-like knob may be provided for holding the roller 179 against the tension of the spring 183, whereby the ticket strip will not be held against the feeding roller 180. The means shown in Fig. 1 therefor comprises knob 182a pivoted to the frame by a stud 182b and having an integral hub 182c provided with a flat portion 182d engaging arm 182 during the time pressure roll 179 is in feeding contact with the paper strip 177, but when said knob 182a is turned from said flat portion 182d so that arm 182 engages the normal surface of hub 182c the said roll 179 is held out of engagement with said strip 177 whereby said strip 177 is not fed any length at each operation. This being done, the machine will print the recording strip as it is operated, and no tickets will be printed or discharged.

Hair-triggers 68 and 68a are respectively loosely mounted on bars 65 and 65a by respective screws 65a1 and 65a2 loosely engaging an opening therein, and are held from lateral displacement in a slot in the forward enlarged end of their respective bars 65 and 65a. Secured on one side of said triggers 68 and 68a respectively are blocks 65a3 and 65a4 resting loosely each in their respective slot 65a5 and 65a6 in bars 65 and 65a. Each block 65a3 and 65a4 is provided with an adjusting screw 65a7 and 65a8 respectively adapted to contact with the bottom of their respective slots 65a5 and 65a6 to raise or lower the forward ends of their respective hair-triggers 68 and 68a, and correspondingly raise or lower the nose of respective pawls 68 and 68a resting in respective slots 69b and 69c and across the tops of said respective triggers 68 and 68a, and thereby to render said hair-triggers more or less sensitive to being tipped.

The top surfaces of said triggers 68 and 68a, adapted to engage the nose of their respective pawls 69 and 69a, is slightly inclined, at 69a2 and 69a3, and in the act of tripping or springing triggers 68 and 68a they are, due to their light contact with respective disks 13 and 14, and their said loose mounting, moved a slight distance toward the respective gears 64 and 64a, within the limits permitted by their blocks 65a3 and 65a4 in respective slots 65a5 and 65a6, which said movement causes inclined surfaces 69a2 and 69a3 to raise their respective pawls 69 and 69a out of their respective notches 69b and 69c, whereupon the mechanism is tripped with the results heretofore described.

The longitudinal movement of each trigger 68 and 68a is uniform for each setting of their respective screws 65a7 and 65a8, and is compensated for in the mechanism so that no inaccuracies in the indicated or printed result may accrue therefrom.

Upon the return to normal position of bar 65 and 65a their respective triggers 68 and 68a are moved forward slightly to enable pawls 69 and 69a to drop into their respective notches 69b and 69a when their respective rack bars 62 and 62a are returned to normal position.

The invention claimed is:

1. In the method of operating non-sensitive means proportionate to a function of means too sensitive to operate the same without impairment of its sensitivity, the steps of associating said means in co-operative relation actuating said sensitive means by a medium a characteristic of which is determinable thereby, then operating said non-sensitive means with the required force, and during said last stated operation controlling the extent of operation of said non-sensitive means by a physical momentary contact with a portion of said sensitive means and which contact is of such delicacy as to not practically impair the sensitiveness of said sensitive means.

2. In the method of operating non-sensitive means proportionate to a function of means too sensitive to operate the same without impairment of its sensitivity, the steps of associating said means in co-operative relation actuating said sensitive means by a medium a characteristic of which is determinable thereby, then operating said non-sensitive means with the required force, and during said last stated operation controlling the extent of operation of said non-sensitive means by a physical momentary contact of portions of said first two named means and which said contact is of such delicacy and brevity as to not practically impair the sensitivity of said sensitive means.

3. In the method of operating non-sensitive means proportionate to a function of means too sensitive to operate the same without impairment of its sensitivity, the steps

of associating said means in co-operative relation affecting said sensitive means by a medium a characteristic of which may be determined thereby, then operating said non-sensitive means with the required force to move said non-sensitive means, and during said last stated operation controlling the extent of movement of said non-sensitive means by the physical momentary contact of a sensitive agency of said non-sensitive means with a portion of said sensitive means, and which said contact is of such delicacy as to not practically impair the sensitivity of said sensitive means.

4. In the method of operating non-sensitive means proportionate to a function of means too sensitive to operate the same without impairment of its sensitivity, the steps of associating said means in co-operative relation affecting said sensitive means by a medium a characteristic of which may be determined therefrom, then operating said operating means with the force required to move said non-sensitive means, and during said last stated operation stopping further movement of any desired portion of said non-sensitive means upon the occurrence of a physical momentary contact between portions of said first two named means and which said contact is of such delicacy as to not practically impair the sensitivity or accuracy of said sensitive means.

5. In the method of operating non-sensitive means proportionate to a function of means too sensitive to operate the same without impairment of its sensitivity, the steps of associating said means in co-operative relation affecting said sensitive means by a medium a characteristic of which may be determined therefrom, then operating said operating means with the force required to move said non-sensitive means; and during said last named operation stopping further movement of, and temporarily securing in its attained position, any desired portion of said non-sensitive means upon the occurrence of a delicate contact with said sensitive means of an operated portion of said non-sensitive means.

6. In the method of operating by an operating means a non-sensitive means proportionate to a function of means too sensitive to operate the same without impairment of its sensitivity, the steps of associating said means in co-operative relation affecting said sensitive means by a medium a characteristic of which may be determined therefrom, then operating said operating means in a definite cycle with the force required to move said non-sensitive means, and during the latter part of said cycle stopping further movement of any desired portion of said non-sensitive means upon the occurrence of a delicate contact with said sensitive means of an operated portion of said non-sensitive means; upon

the occurrence of the next succeeding cycle of said operating means returning to normal position said stopped portion of said non-sensitive means during the initial part of said cycle.

7. In a printing mechanism for scales, the combination with a weight controlled member on said scales, of a plurality of type bearing members, and means independent of said weight controlled member and separable from said type bearing members for actuating said type members, to the extent controlled by said weight controlled member, whereby the indicated weight may be printed thereby.

8. In a printing mechanism for scales, the combination of a scale, of weight controlled means adapted at all times to be freely moved by said scale proportionate to the weight weighed thereon, a plurality of type bearing members independent of said means, means in fixed relation to the normal position of said control means for immediately supporting said members, and means whereby the extent of operation of said members is controlled by said freely movable control means without thereby changing its position or condition.

9. In a printing mechanism for scales, the combination with a weight controlled member on said scales, of a plurality of pivoted type bearing members each of whose axes is in fixed bodily relation to said control member, means mounted independently of said members and normally out of engagement therewith adapted to be brought into engagement and arrest said type members in position for printing the indicated weight upon contact with said weight controlled member, and independent means for operating said type members and for bringing said means into said engagement with said weight controlled member.

10. In a printing mechanism for scales, the combination with a weight controlled member on said scales, of a plurality of pivotally mounted type bearing members, and means independent of said weight controlled member and separable from said type bearing members for positioning said pivotally mounted type members about their pivotal mountings to the extent controlled by said weight controlled member, whereby the indicated weight may be printed thereby.

11. In a printing mechanism for scales, the combination with a weight controlled mechanism on said scales, of a plurality of pivotally mounted type bearing members, mechanical means for moving said members about their pivotal mountings, and independent mechanical means arrested by the position of the weight controlled member for engaging said type members during their pivotal movement and locking them in position to print the indicated weight.

12. In a printing mechanism for scales, the combination with a weight controlled member on said scales, of a plurality of type bearing members, and means positioned intermediate said weight controlled and type bearing members and normally out of engagement therewith adapted to engage and position said type members upon engaging said weight controlled member, whereby said type members will be positioned for printing the indicated weight.

13. In a printing mechanism for scales, the combination with a weight controlled member on said scales, of a plurality of type bearing members, means positioned intermediate said weight controlled and type bearing members and normally out of engagement therewith adapted to engage and position said type members upon engaging said weight controlled member, and means for engaging said type members and aligning the type thereon, whereby the indicated weight may be printed thereby.

14. In a printing mechanism for scales, the combination with a weight controlled member on said scales, of a plurality of type bearing members, means independent of said weight controlled member and separable from said type bearing members for positioning said type members to the extent controlled by said weight controlled member, means for feeding a recording strip to a position adjacent said type members, and means for forcing said type members and strip against each other for receiving an impression, whereby the indicated weight may be printed thereon.

15. In a printing mechanism for scales, the combination with a weight controlled member on said scales, of a plurality of type bearing members, means independent of said said weight controlled member and separable from said type bearing members at points determined by said weight controlled member for positioning said type members, means for feeding a recording strip to a position adjacent said type members, means for forcing said type members and strip against each other for receiving an impression, and means for cutting said strip at a given point for permitting the discharge of the impressed portion thereof, and a common driver for operating all said means, whereby the indicated weight may be printed thereon.

16. In a scale, the combination with a weight controlled member on said scales, of a rotary disk associated with said member, said disk varying in radius at different points about its periphery, a plurality of indicating members, and means independent of said weight controlled member and separable from said indicating members for positioning said indicating members relatively to said weight controlled member, whereby the weight may be indicated thereby.

17. In a scale, the combination with a weight controlled member on said scales, of a rotary disk associated with said member, said disk varying in radius at different points about its periphery, a plurality of indicating members, and means independent of said weight controlled member and separable from said indicating members upon its engagement with the periphery of said disk at points determined by said weight controlled member for positioning said indicating members, whereby the weight may be indicated thereby.

18. In a printing mechanism for scales, the combination with a weight controlled member on said scales, of a rotary disk associated with said member, said disk varying in radius at different points about its periphery, a plurality of type bearing members, means for moving said type bearing members, and means arrested by engagement with the periphery of said disk during the movement of said members for engaging and locking the same in a given position depending upon the rotary position of said disk, whereby the indicated weight may be printed thereby.

19. In a printing mechanism for scales, the combination with a weight controlled member on said scales, of a rotary disk associated with said member, said disk varying in radius at different points about its periphery, a plurality of type bearing members, means for raising and lowering said type members, a sliding bar actuated by the lowering of said members so as to be moved into engagement with said disk, a trip member for releasing said bar upon engagement therewith, and means for causing said bar to engage said type members upon the release thereof and locking them in a given position during their downward movement, whereby the weight indicated by the position of said disk may be printed thereby.

20. In a printing mechanism for scales, the combination with a weight controlled member on said scales, of a rotary disk associated with said member, said disk varying in radius at different points about its periphery, a plurality of type bearing members, means for raising and lowering said type members, a sliding bar actuated by the lowering of said members so as to be moved into engagement with said disk, a trip member for releasing said bar upon engagement therewith, means for causing said bar to engage said type members upon the release thereof and locking them in a given position during their downward movement, means for feeding a strip of paper in position to be printed by said type members, and means for forcing said paper and type members together for leaving an impression thereon.

21. In a printing mechanism for scales, the combination with a weight controlled member on said scales, of a pair of rotary disks as-

sociated with said member, one of said disks being stepped down to a smaller radius about its periphery, the second disk being provided with a ratchet tooth periphery having one tooth for each stepped down portion of said first-mentioned disk, a pair of pivotally mounted type bearing members, one for each of said disks, means for moving said type members about their mounting, and means actuated by the movement of said type members for engaging with the periphery of said disks for arresting a further movement of said type members thereupon and thereby positioning said type members for printing the indicated weight.

22. In a printing mechanism for scales, the combination with a weight controlled member on said scales, of a pair of rotary disks associated with said member, one of said disks being stepped down to a smaller radius about its periphery, the second disk being provided with a ratchet tooth periphery having one tooth for each stepped down portion of said first-mentioned disk, a pair of pivotally mounted type bearing members, one for each of said disks, means for moving said type members about their mounting, a pair of sliding bars actuated by the movement, about their said pivot, of said type members for being moved to engagement with the periphery of the respective disks, and means for releasing said bars upon said engagement for causing them to act so as to arrest the further movement of said type members at a given position, whereby the indicated weight may be printed thereon.

23. In a printing mechanism for scales, the combination with a weight controlled member on said scales, of a plurality of rotary disks associated with said member, one of said disks being provided with ten distinct variations in radius about its periphery, said variations being stepped down about the entire periphery thereof, and another disk being connected therewith and having a tooth-like portion about its periphery corresponding with each of said stepped down portions for varying its radius throughout a one-tenth section of its periphery, each section having the same variation, a pair of pivoted type bearing members corresponding to, and whose axes are in fixed bodily relation to, said disks, and means associated with each of said type members for arresting further movement of said type members upon engagement with the periphery of their respective disks, whereby the type of said type members will be properly positioned for printing the indicated weight.

24. In a printing mechanism for scales, the combination with a weight controlled member on said scales, of a pair of rotary disks associated with said member, one of said disks being provided with ten distinct variations in radius about its periphery, said variations being stepped down about the entire periph-

ery thereof, and the other disk being connected therewith and having a tooth-like portion about its periphery corresponding with each of said stepped down portions for varying its radius throughout a one-tenth section of its periphery, each section having the same variation, a pair of type bearing members corresponding to said disks, a pair of sliding bars adapted to be moved towards said disks upon the movement of said type members until the periphery of said disks are engaged thereby respectively, and a releasing latch on each of said bars for releasing the same upon engagement with their respective disks for causing them to engage their respective type bearing members and arresting their further movement for presenting the proper type in position for printing the weight.

25. In a printing mechanism for scales, the combination with a weight controlled member on said scales, of a pair of rotary disks associated with said member, one of said disks being provided with ten distinct variations in radius about its periphery, said variations being stepped down about the entire periphery thereof, and the other disk being connected therewith and having a tooth-like portion about its periphery corresponding with each of said stepped down portions for varying its radius throughout a one-tenth section of its periphery, each section having the same variation, a pair of segmental members pivotally mounted at their reduced end and provided with type on their arcuate face, means for elevating and lowering said segmental members about their pivotal mounting, a sliding bar for each of said segmental members, means for moving said bars toward said disks upon the lowering of said members, means for tripping and releasing said bars upon engagement thereof with their respective disks, and means for causing said bars upon their release to engage and arrest the further movement of said members independently of each other so as to position them for presenting the proper type to print the indicated weight.

26. In a printing mechanism for scales, the combination with a weight controlled member on said scales, of a pair of rotary disks associated with said member, one of said disks being stepped down to a smaller radius about its periphery, the second disk being provided with a ratchet tooth periphery having one tooth for each stepped down portion of said first-mentioned disk, a pair of pivotally mounted type bearing members, one for each of said disks, means for moving said type members about their mounting, means actuated by the movement of said type members for engaging with the periphery of said disks for arresting a further movement of said type members thereupon and thereby positioning said type members for printing the indicated weight, a third type bearing member associ-

ated with said first-mentioned members, and means controlled by the positioning of one of the other members for engaging and arresting said third member, whereby all three type bearing members will be so positioned relative to each other as to print the indicated weight to three digits.

27. In a printing mechanism for scales, the combination with a weight controlled member on said scales, of a pair of rotary disks associated with said member, one of said disks being stepped down to a smaller radius about its periphery, the second disk being provided with a ratchet tooth periphery having one tooth for each stepped down portion of said first-mentioned disk, a pair of pivotally mounted type bearing members, one for each of said disks, means for moving said type members about their mounting, a pair of sliding bars actuated by the movement of said type members for being moved to engagement with the periphery of the respective disks, means for releasing said bars upon said engagement for causing them to act so as to arrest the further movement of said type members at a given position, a third type bearing member associated with said first-mentioned members, and means controlled by the positioning of one of the other members for engaging and arresting said third member, whereby all three type bearing members will be so positioned relative to each other as to print the indicated weight to three digits.

28. In a printing mechanism for scales, the combination with a weight controlled member on said scales, of a plurality of rotary disks associated with said member, one of said disks being provided with ten distinct variations in radius about its periphery, said variations being stepped down about the entire periphery thereof, and the other disk being connected therewith and having a tooth-like portion about its periphery corresponding with each of said stepped down portions for varying its radius throughout a one-tenth section of its periphery, each section having the same variation, a pair of type bearing members corresponding to said disks, means associated with each of said type members for positioning the same upon engagement with the periphery of their respective disks, a third type bearing member associated with said first-mentioned members, and means controlled by the positioning of one of the other members for engaging and arresting said third member, whereby all three type bearing members will be so positioned relative to each other as to print the indicated weight to three digits.

29. In a printing mechanism for scales, the combination with a weight controlled member on said scales, of a plurality of rotary disks associated with said member, one of said disks being provided with ten distinct variations in radius about its periphery, said

variations being stepped down about the entire periphery thereof, and the other disk being connected therewith and having a tooth-like portion about its periphery corresponding with each of said stepped down portions for varying its radius throughout a one-tenth section of its periphery, each section having the same variation, a pair of type bearing members corresponding to said disks, a pair of sliding bars adapted to be moved towards said disks upon the movement of said type members until the periphery of said disks are engaged thereby respectively, a releasing latch on each of said bars for releasing the same upon engagement with their respective disks for causing them to engage their respective type bearing members and arresting their further movement for presenting the proper type in position for printing the weight, whereby all three type bearing members will be so positioned relative to each other as to print the indicated weight to three digits.

30. In a printing mechanism for scales, the combination with a weight controlled member on said scales, of a plurality of rotary disks associated with said member, one of said disks being provided with ten distinct variations in radius about its periphery, said variations being stepped down about the entire periphery thereof, and the other disk being connected therewith and having a tooth-like portion about its periphery corresponding with each of said stepped down portions for varying its radius throughout a one-tenth section of its periphery, each section having the same variation, a pair of segmental members pivotally mounted at their reduced end and provided with type on their arcuate face, means for elevating and lowering said segmental members about their pivotal mounting, a sliding bar for each of said segmental members, means for moving said bars toward said disks upon the lowering of said members, means for tripping and releasing said bars upon engagement thereof with their respective disks, means for causing said bars upon their release to engage and arrest the further movement of said members independently of each other so as to position them for presenting the proper type to print the indicated weight, a third segmental member associated with said first-mentioned members, and means controlled by the positioning of one of the other members for engaging and arresting said third member, whereby all three segmental members will be so positioned relative to each other as to print the indicated weight to three digits.

31. In a printing mechanism for scales, the combination with a weight controlled member on said scales, of a pair of rotary disks associated with said member, one of said disks being stepped down to a smaller radius about its periphery, the second disk being provided with a ratchet tooth periphery having one

tooth for each stepped down portion of said first-mentioned disk, a pair of pivotally mounted type bearing members, one for each of said disks, means for moving said type members about their mounting, one of said type bearing members being provided with ten teeth of equal size and depth, a third type bearing member provided with ten teeth of varying depth, and means adapted to be positioned by engagement with the first-mentioned teeth for selectively engaging one of the teeth according to its depth on the third member so as to control the relative printing positions thereof.

32. In a printing mechanism for scales, the combination with a weight controlled member on said scales, of a plurality of rotary disks associated with said member, one of said disks being provided with ten distinct variations in radius about its periphery, said variations being stepped down about the entire periphery thereof, and the other disk being connected therewith and having a tooth-like portion about its periphery corresponding with each of said stepped down portions for varying its radius throughout a one-tenth section of its periphery, each section having the same variation, a pair of type bearing members corresponding to said disks, a pair of sliding bars adapted to be moved towards said disks upon the movement of said type members until the periphery of said disks are engaged thereby respectively, a releasing latch on each of said bars for releasing the same upon engagement with their respective disks for causing them to engage their respective type bearing members and arresting their further movement for presenting the proper type in position for printing the weight, one of said type bearing members being provided with ten teeth of equal size and depth, a third type bearing member provided with ten teeth of varying depth, and means adapted to be positioned by engagement with the first-mentioned teeth for selectively engaging one of the teeth according to its depth on the third member so as to control the relative printing positions thereof.

33. In a printing mechanism for scales, the combination with a weight controlled member on said scales, of a plurality of rotary disks associated with said member, one of said disks being provided with ten distinct variations in radius about its periphery, said variations being stepped down about the entire periphery thereof, and the other disk being connected therewith and having a tooth-like portion about its periphery corresponding with each of said stepped down portions for varying its radius throughout a one-tenth section of its periphery, each section having the same variation, a pair of segmental members pivotally mounted at their reduced end and provided with type on their arcuate face, means for elevating and lowering said seg-

mental members about their pivotal mounting, a sliding bar for each of said segmental members, means for moving said bars toward said disks upon the lowering of said members, means for tripping and releasing said bars upon engagement thereof with their respective disks, means for causing said bars upon their release to engage and arrest the further movement of said members independently of each other so as to position them for presenting the proper type to print the indicated weight, one of said type bearing members being provided with ten teeth of equal size and depth, a third type bearing member provided with ten teeth of varying depth, and means adapted to be positioned by engagement with the first-mentioned teeth for selectively engaging one of the teeth according to its depth on the third member so as to control the relative printing positions thereof.

34. In a printing mechanism for scales, control means operated by the scale, a type bearing member, a driver for said type member, means controlled by said control means for disconnecting said type member from said driver, a counterbalance weight, an independent type bearing member, and means for positioning said independent type bearing member for printing a given weight upon said counterbalance weight being brought to operative position.

35. In a printing mechanism for scales, control means operated by the scale, a type bearing member, a driver for said type member, means controlled by said control means for disconnecting said type member from said driver, a counterbalance weight, an independent type bearing member, and a single means connected to said independent type bearing member for moving it to position for printing a given weight simultaneously with the bringing of said counterbalance weight into operative position.

36. In a printing mechanism for scales, control means operated by the scale, a type bearing member, a driver for said type member, means controlled by said control means for disconnecting said type member from said driver, a counterbalance weight, an independent type bearing member, a support for maintaining said counterbalance weight out of operative position with respect to said scale, and means for simultaneously actuating said support for permitting said counterbalance weight to assume its operative position and move said independent type member to position for printing a given weight.

37. In a printing mechanism for scales, the combination with a weighing scale, type bearing means operable in definite relation to the mass on said scale, mechanical operating means independent of said scale for operating said type bearing means in definite relation to the mass on said scale, a counterbalance

weight, and a support therefor mounted on said scale, of a pivotally mounted type bearing segment, a bracket for supporting said counterbalance weight out of engagement with said support, and means for simultaneously removing said bracket for permitting said weight to rest upon said support for affecting said scale and positioning said type member for printing the weight corresponding to said counterbalance weight.

38. In a printing mechanism for scales, the combination with a counterbalance weight, and a support therefor mounted on said scale, of a pivotally mounted type bearing segment, a bracket for supporting said counterbalance weight above the support therefor and spaced therefrom, an operating handle, and means connecting said handle and bracket for simultaneously lowering the latter until said counterbalance weight rests upon said support for operating said scale to move said segment about on its pivotal mounting to the position for printing a given weight indicated by said counterbalance weight.

39. In a printing mechanism for scales, the combination with a plurality of counterbalance weights of varying diameters, and a support therefor mounted on said scale, of a pivotally mounted type bearing segment, a cone-shaped bracket having stepped seats for supporting each of said counterbalance weights spaced from each other above said support, parallel supporting bars pivoted at one end to a suitable support and at the other end to said bracket for permitting the same to have vertical movement, an operating handle, and means connecting said operating handle with said bracket and segment for simultaneously operating the same for bringing the respective counterbalance weights into operative position on their support and moving said segment about its pivotal mounting in position to print a weight represented by said operatively positioned counterbalance weights.

40. In a printing mechanism for scales, the combination with the weight-controlled member on said scales, and a counterbalance weight, of a plurality of type bearing members, means actuated by the position of said weight controlled member for positioning certain of said type members in position to print a given weight indicated by said weight controlled member, and means controlled by said counterbalance weight for positioning a certain other type bearing member for printing an additional weight upon said counterbalance weight being brought to operative position.

41. In a printing mechanism for scales, the combination with a weight controlled member on said scale, and a counterbalance weight therefor, of a pair of rotary disks associated with said member, one of said disks being

stepped down to a smaller radius about its periphery, the second disk being provided with a ratchet tooth periphery having one tooth for each stepped down portion of said first-mentioned disk, a pair of pivotally mounted type bearing segments, one for each of said disks, means for moving said segments about their mounting, means actuated by the movement of said segments for engaging with the periphery of said disks for arresting a further movement of said segments thereupon and thereby positioning said segment for printing a weight indicated by said disks, a third printing segment, means controlled by one of said first-mentioned segments for positioning said third segment in printing position, means for aligning said segments, a fourth segment, and means controlled by the operative positioning of said counterbalance weight for positioning said fourth segment in printing position.

42. In a printing mechanism of the character described, the combination with a member to be moved to a given position, a plurality of type bearing members, and means independent of said first named member and separable from said type bearing members at points determined by said first named member for positioning said type members, whereby certain data may be printed thereon.

43. In a printing mechanism of the character described, the combination with a member to be moved to a given position, a plurality of type bearing members, means mounted independently of said members and normally out of engagement therewith adapted to be brought into engagement and lock said type members at points controlled by said controlled member for printing certain data upon said first mentioned member.

44. In a printing mechanism of the character described, the combination with a member to be moved to a given position, a plurality of pivotally mounted type bearing members, means for moving said members about their pivotal mountings, and independent means actuated by the position of said first-mentioned member for engaging said type bearing members during their pivotal movement and locking them in position to print a certain data.

45. In a printing mechanism of the character described, the combination with an actuated member, of a plurality of positioning members associated therewith, one of said positioning members being provided with a plurality of distinct variations upon the surface thereof, said variations being stepped down, and the other positioning member being connected therewith and having a tooth-like surface, a pair of type bearing members corresponding to said positioning members, a pair of sliding bars adapted to be moved towards said positioning members upon the movement of said type members

until the surfaces of said positioning members are engaged thereby respectively, and a releasing latch on each of said bars for releasing the same upon engagement with their respective positioning members for causing them to engage their respective type bearing members and arresting their further movement for presenting the proper type in position for printing a certain data.

46. In a printing mechanism of the character described, the combination with an actuated member, of a positioning member having variations in its surface, a pivotally mounted segmental type bearing member, an arcuate type bearing surface thereon having its center of curvature at the pivotal mounting thereof, a curved plate mounted on said segmental member having one edge thereof curved in an arc having its center of curvature eccentric to said pivotal mounting, and means actuated by engagement with said positioning member for thereupon engaging the eccentrically curved surface of said plate for arresting the movement of said segment about its pivotal mounting and thereby positioning it to print certain data.

47. In an instrument of precision, a sensitive precision determining means, indicating means independent of said sensitive means; means independent of said sensitive means, and having a uniform extent of movement at each operation, for operating said indicating means, and means controlled by said sensitive means for disconnecting said indicating means from said operating means at different points throughout a uniform extent of movement of said operating means, whereby the result determined by said sensitive means may be indicated.

48. In an instrument of precision, a sensitive precision determining means, indicating means independent of said sensitive means, means independent of said sensitive means and having two uniform portions of movement for operating said indicating means, means controlled by said sensitive means for disconnecting said indicating means from said operating means at variable points throughout one of said portions of movement of said operating means, whereby the result determined by said sensitive means may be indicated, and means for returning said indicating means to normal position during the other portion of movement of said operating means.

49. In an instrument of precision, a sensitive precision determining means, a plurality of indicating means independent of said sensitive means, means independent of said sensitive means and having a definite extent of movement at each operation for operating said plurality of indicating means controlled by said determining means, and means for disconnecting each of said plurality of indicating means from said operating means at

different points throughout an extent of movement of said operating means.

50. In an instrument of precision, a sensitive precision determining means, indicating means independent of said sensitive means, means independent of said sensitive means and having two definite portions of movement for operating said indicating means, means for returning said indicating means to normal position from the previous indication by said operating means during its first portion of movement, and means controlled by said sensitive means for disconnecting said indicating means from said operating means at different points throughout the subsequent portion of movement of said operating means.

51. In an instrument of precision, a sensitive precision determining means, a plurality of indicating means independent of said sensitive means, means independent of said sensitive means and having two uniform portions of movement at each operation for operating said indicating means, means for returning each of said plurality of indicating means to normal position from its previous indication by said operating means during its first portion of movement, and means controlled by said sensitive means for disconnecting each of said plurality of indicating means from said operating means at variable points throughout the subsequent portion of movement of said operating means.

52. In an instrument of precision, a control means, a plurality of indicating means, means for operating each of said indicating means, means controlled by said control means for arresting the movement of part of said indicating means, and means controlled by the arrested position of one of said indicating means for arresting the unarrested indicating means.

53. In an instrument of precision, a control means, a plurality of indicating means, means for operating each of said indicating means, means controlled by said control means for arresting the movement of part of said indicating means, means controlled by the arrested position of one of said indicating means for arresting the unarrested indicating means, and means actuated by said operating means for aligning said indicating means.

54. Two indicating means having indicating characters thereon, means for operating each of said indicating means, means for arresting the movement of one of said indicating means at any of a plurality of points intermediate each indicating character thereon, and means for arresting the movement of the unarrested indicating means at a point determined by the arrested position of the other indicating means.

55. Two indicating means each having indicating characters thereon, means for operating said indicating means, means for ar-

resting the movement of one of said indicating means at any of a plurality of points intermediate each indicating character thereon, means for arresting the movement of the unarrested indicating means at a point determined by the arrested position of the other indicating means, and means for aligning the indicating characters on said two indicating means.

56. Two indicating means each having indicating characters thereon, means for successively operating said indicating means, means for arresting the movement of the first operated indicating means at any of a plurality of points intermediate each indicating character thereon, and means for arresting the movement of the second operated indicating means at a point determined by the arrested position of said first operated indicating means.

57. Two indicating means each having indicating characters thereon, means for successively operating said indicating means, means for arresting the movement of the first operated indicating means at any of a plurality of points intermediate each indicating character thereon, means for arresting the movement of the second operated indicating means at a point determined by the arrested position of said first operated indicating means, and means for aligning the indicating characters on said two indicating means.

58. In an instrument of precision, a sensitive control means, two indicating means each having indicating characters thereon, means independent of said sensitive means for operating each of said indicating means, means controlled by said sensitive means for arresting the movement of one of said indicating means at any of a plurality of points intermediate each indicating character thereon, and means for arresting the movement of the unarrested indicating means at a point determined by the arrested position of the other indicating means.

59. In an instrument of precision, a sensitive control means, two indicating means each having indicating characters thereon, means independent of said sensitive means for operating each of said indicating means, means controlled by said sensitive means for arresting the movement of one of said indicating means at any of a plurality of points intermediate indicating characters thereon, means for arresting the movement of the unarrested indicating means at a point determined by the arrested position of the other indicating means, and means for aligning the indicating characters on said indicating means.

60. In an instrument of precision, a sensitive control means, two indicating means each having indicating characters thereon, means independent of said sensitive means for successively operating said indicating means,

means controlled by said sensitive means for arresting the movement of the first operated one of said indicating means at any of a plurality of points intermediate indicating characters thereon, means for arresting the movement of the second operated indicating means at a point determined by the arrested position of said first operated indicating means, and means for aligning the indicating characters on said two indicating means.

61. Two indicating means each having indicating characters thereon, the characters upon one of said means being of higher denomination than those on the other of said indicating means, means for operating each of said indicating means, means for arresting the movement of said higher denomination indicating means at any of a plurality of points intermediate indicating characters thereon, and means for arresting the movement of said lower denomination indicating means at the point determined by the arrested position of said higher denomination indicating means.

62. An indicating means having a series of characters thereon indicating amounts, a second indicating means having a series of characters thereon indicating the amounts between each character on said first indicating means, means for operating each of said indicating means, means for arresting the movement of said first indicating means at a plurality of points at and between each character thereon, and means for arresting the movement of said second indicating means at the point determined by the arrested position of said first indicating means.

63. An indicating means having a series of characters thereon indicating amounts, a second indicating means having a series of characters thereon indicating the amounts between each character on said first indicating means, means for operating each of said indicating means, means for arresting the movement of said first indicating means at a plurality of points at and between each character thereon, means for arresting the movement of said second indicating means at the point determined by the arrested position of said first indicating means, and means for aligning the indicating characters on said first and second indicating means.

64. In an instrument of precision, sensitive control means, two indicating means each having indicating characters thereon, the characters upon one of said means being of higher denomination than those on the other indicating means, means independent of said sensitive means for operating each of said indicating means, means actuated by said controlled means for arresting the movement of said higher denomination indicating means at any of a plurality of points at and between each indicating character thereon, and means for arresting said lower denomination indi-

cating means at the point determined by the arrested position of said higher denomination indicating means.

65. In an instrument of precision, sensitive control means, an indicating means having a series of characters thereon indicating amounts, a second indicating means having a series of characters thereon indicating the amounts between each character on said first indicating means, means independent of said precession means for operating each of said indicating means, means actuated by said controlled means for arresting the movement of said first indicating means at any of a plurality of points at and between each character thereon, and means for arresting the movement of said second indicating means at the point determined by the arrested position of said first indicating means.

66. In an instrument of precision, sensitive control means, an indicating means having a series of characters thereon indicating amounts, a second indicating means having a series of characters thereon indicating the amounts between each character on said first indicating means, means independent of said precision means for operating each of said indicating means, means actuated by said controlled means for arresting the movement of said first indicating means at any of a plurality of points at and between each character thereon, means for arresting the movement of said second indicating means at the point determined by the arrested position of said first indicating means, and means for aligning the indicating characters on said first and second indicating means.

67. In an instrument of precision, a sensitive control means, indicating means, means for operating said indicating means independent of said sensitive means, and means including a movably mounted trigger for arresting the movement of said indicating means at a point determined by said sensitive means.

68. In an instrument of precision, a sensitive control means, indicating means, means for operating said indicating means independent of said sensitive means, means including a movably mounted trigger for arresting the movement of said indicating means at a point determined by said sensitive means, and means for varying the sensitiveness of said trigger.

69. In an instrument of precision, a sensitive control means, a plurality of indicating means, means for operating said indicating means, a plurality of means each including a movably mounted trigger for arresting the movement of said indicating means at points determined by said sensitive means.

70. In an instrument of precision, a sensitive control means, a plurality of indicating means, means for operating said indicating means, a plurality of means each including

a movably mounted trigger for arresting the movement of said indicating means at points determined by said sensitive means, and means for varying the sensitiveness of each of said triggers.

71. In an instrument of precision, a sensitive control means, means bearing printing characters, independent operating means for said means bearing printing characters, means including a movably mounted trigger for arresting the movement of said means bearing printing characters at points determined by said sensitive means, a ticket, a detail record, and means operated by said operating means for printing on said record the previously indicated amount and subsequently printing said ticket with the presently indicated amount at each operation of said operating means.

72. In an instrument of precision, a sensitive means, means bearing printing characters, independent operating means for said means bearing printing characters, said operating means having two portions of movement at each operation, a detail record, a ticket, means including a movably mounted trigger for arresting the movement of said means bearing printing characters at points determined by said sensitive means, and means whereby in the first portion of movement of said operating means said detail record is printed and the said characters returned to their normal position, and in the second portion of movement of said operating means said characters are properly positioned and said ticket printed.

73. In an instrument of precision, a sensitive means, means bearing printing characters, independent operating means for said means bearing printing characters, said operating means having two portions of movement at each operation, a detail record, a ticket; means, including a movably mounted trigger adapted to be brought into contact with said sensitive means, for arresting the movement of said printing characters at points determined by said sensitive means, and means whereby in the first portion of movement of said operating means said detail record is printed and said characters returned to their normal position, and in the second portion of movement of said operating means said characters are properly positioned and said ticket printed.

74. In an instrument of precision, a sensitive means, a member operable proportionate to said means, operating means for said member independent of said sensitive means, means for arresting the movement of said member at points determinable by said sensitive means, and means for compelling the operation of said operating means only in a definite direction and preventing its opposite operation, substantially as specified.

75. In an instrument of precision, a sen-

sitive means, a member operable proportionate to said means, operating means for said member independent of said sensitive means, means for arresting the movement of said member at points determinable by said sensitive means, means for limiting the operation of said operating means to a definite cycle and stopping the same as a fixed point at each operation, substantially as specified.

76. In an instrument of precision, a sensitive means, a plurality of indicating means operable proportionate to said means, a common operating means for said indicating means independent of said sensitive means, means for arresting the movement of said indicating means at points determinable by said sensitive means, and means for compelling the operation of said operating means only in a definite direction and preventing its opposite operation, substantially as specified.

77. In an instrument of precision, a sensitive means, a plurality of indicating means operable proportionate to said means, a common operating means for said indicating means independent of said sensitive means, means for arresting the movement of said indicating means at points determinable by said sensitive means, means for compelling the operation of said operating means only in a definite direction and preventing its opposite operation, and means for limiting the operation of said operating means to a definite cycle and stopping the same as a fixed point at each operation, substantially as specified.

78. In an instrument of precision, a sensitive means, a member operable proportionate to said means, operating means for said member independent of said sensitive means, means for arresting the movement of said member at points determinable by said sensitive means, and means for locking said operating means at a definite point and which locking means must be operated before said operating means may be operated, substantially as specified.

79. In an instrument of precision, a sensitive means, a member operable proportionate to said means, operating means for said member independent of said sensitive means, means for arresting the movement of said member at points determinable by said sensitive means, means which must be operated before said operating means may be operated, and means for compelling the operation of said operating means only in a definite direction, substantially as specified.

80. In an instrument of precision, a sensitive means, indicating means operable proportionate to said sensitive means, means for arresting the movement of said indicating means at points determined by said sensitive means, driving means for said indicating means independent of said sensitive means,

means for limiting said driving means to a definite extent of movement and stopping the same at a fixed point at each operation, and means for releasing said driving means at

each operation, substantially as specified.

81. In an instrument of precision, a sensitive means, an indicating means, means independent of said sensitive means for driving said indicating means, means controlled by said sensitive means for determining the indicating position of said indicating means, and means independent of said sensitive means for arresting further driving of said indicating means by said driving means when said determined indicating position has been attained, substantially as specified.

82. In an instrument of precision, a sensitive means, an indicating means, means independent of said sensitive means for driving said indicating means, means driven by said driving means and controlled by said sensitive means for determining the indicating position of said indicating means, and means independent of said sensitive means for arresting further driving of said indicating means by said driving means when said determined indicating position has been attained, substantially as specified.

83. In an instrument of precision, a sensitive means, an indicating means, means independent of said sensitive means for driving said indicating means, means controlled by said sensitive means for determining the indicating position of said indicating means, means independent of said sensitive means for arresting further driving of said indicating means by said driving means when said determined indicating position has been attained, and means whereby said indicating means is returned to normal position by said driving means, substantially as specified.

84. In an instrument of precision, a sensitive means, an indicating means, means independent of said sensitive means for driving said indicating means, means controlled by said sensitive means for determining the indicating position of said indicating means, a second sensitive means for engaging said first named sensitive means for determining when said controlled means will exercise its said determining function, and means independent of said sensitive means for arresting further driving of said indicating means by said driving means when said determined indicating position has been attained, substantially as specified.

85. In an instrument of precision, a sensitive means, an indicating means, means independent of said sensitive means for driving said indicating means, means controlled by said sensitive means for determining the indicating position of said indicating means, a second sensitive means driven by said driving means for engaging said first named sensitive means for determining when said con-

trolled means will exercise its said determining function, and means independent of said sensitive means for arresting further driving of said indicating means by said driving means when said determined indicating position has been attained, substantially as specified.

86. In an instrument of precision, a sensitive means, an indicating means, means independent of said sensitive means for driving said indicating means, means controlled by said sensitive means for determining the indicating position of said indicating means, a second sensitive means for engaging said first named sensitive means for determining when said controlled means will exercise its said determining function, means independent of said sensitive means for arresting further driving of said indicating means by said driving means when said determined indicating position has been attained, and means for compelling the operation of said operating means only progressively, substantially as specified.

87. In an instrument of precision, a sensitive means, a plurality of indicating means, means independent of said sensitive means for driving each of said plurality of indicating means, separate means controlled by said sensitive means for determining the indicating position of each of said plurality of indicating means, and means independent of said sensitive means for arresting further driving of each of said plurality of indicating means by said driving means when its determined indicating position has been attained, substantially as specified.

88. In an instrument of precision, a sensitive means, a plurality of indicating means, means independent of said sensitive means for driving each of said plurality of indicating means, a corresponding plurality of separate means controlled by said sensitive means for determining the indicating position of each of said plurality of indicating means, a corresponding plurality of second sensitive means for engaging said first named sensitive means for determining when each of said series of controlled means will exercise its said determining function, and means independent of said sensitive means for arresting further driving of each of said plurality of indicating means by said driving means when its determined indicating position has been attained, substantially as specified.

89. In an instrument of precision, a sensitive means, means bearing printing characters, a platten, means independent of said sensitive means for driving all said means other than said sensitive means and for relatively moving said platten and said means bearing printing characters, means controlled by said sensitive means for determining the position at a given time of said means bearing print-

ing characters, means independent of said sensitive means for arresting further driving by said driving means of said means bearing printing characters when said determined position of said means bearing printing characters has been attained, and means whereby said driving means relatively moves said platten and said means bearing printing characters after said attainment of said determined position of said means bearing printing characters, substantially as specified.

90. In an instrument of precision, a sensitive means, means bearing printing characters, a platten, means independent of said sensitive means for driving all said means other than said sensitive means and for relatively moving said platten and said means bearing printing characters, means controlled by said sensitive means for determining the position at a given time of said means bearing printing characters; means independent of said sensitive means for arresting further driving, by said driving means of said means bearing printing characters, when said determined position of said means, bearing printing characters has been attained; means whereby said driving means relatively moves said platten and said means bearing printing characters after said attainment of said determined position of said means bearing printing characters, and means for compelling the operation of said operating means only progressively, substantially as specified.

91. In an instrument of precision, a sensitive means, means bearing printing characters, a platten, means independent of said sensitive means for driving all said means other than said sensitive means and for relatively moving said platten and said means bearing printing characters, means controlled by said sensitive means for determining the position at a given time of said means bearing printing characters; means independent of said sensitive means for arresting further driving, by said driving means of said means bearing printing characters, when said determined position of said means bearing printing characters has been attained; means whereby said driving means relatively moves said platten and said means bearing printing characters after said attainment of said determined position of said means bearing printing characters, means for returning to normal position said means bearing printing characters at each cycle of the operation of said driving means, and means for compelling the operation of said driving means only progressively, substantially as specified.

92. In an instrument of precision, a sensitive means, means bearing printing characters, a platten, means independent of said sensitive means for driving all said means other than said sensitive means and for relatively moving said platten and said means

bearing printing characters, means controlled by said sensitive means for determining the position at a given time of said means bearing printing characters; means independent of said sensitive means for arresting further driving of said means bearing printing characters when its said determined position has been obtained; means whereby said driving means twice relatively moves said platten and said means bearing printing characters after each attainment of said determined position of said means bearing printing characters, and means for compelling the operation of said driving means only progressively, substantially as specified.

93. In an instrument of precision, a sensitive means, means bearing printing characters, a platten, means independent of said sensitive means for driving all said means other than said sensitive means, means controlled by said sensitive means for determining the position at a given time of said means bearing printing characters; means independent of said sensitive means for arresting further driving of said means bearing printing characters upon its attainment of said determined position; means whereby said driving means relatively moves said platten and said means bearing printing characters a plurality of times after each attainment of said determined position of said means bearing printing characters, whereby a plurality of printings of each indication may be made, substantially as specified.

94. In an instrument of precision, a sensitive control means, means bearing printing characters, a platten, operating means independent of said sensitive control means for operating said means bearing printing characters, means controlled by said sensitive control means for operatively disconnecting said operating means and said means bearing printing characters, and means whereby said operating means relatively moves said platten and said means bearing printing characters a plurality of times after said operative disconnection, substantially as specified.

95. In an instrument of precision, a sensitive control means, means bearing printing characters, a platten; operating means independent of said control means, for operating said means bearing printing characters; means controlled by said sensitive control means, for operatively disconnecting said operating means and said means bearing printing characters, means operated by said operating means for locking said indicating means after said operative disconnection; and means whereby said operating means relatively moves said platten and said means bearing printing characters a plurality of times, while said means bearing printing characters remain locked, substantially as specified.

96. In an instrument of precision, a sensitive precision determining means, indicating means independent of said sensitive means; means independent of said sensitive means, and having a uniform extent of movement at each operation, for operating said indicating means, means controlled by said sensitive means for disconnecting said indicating means from said operating means at different points throughout a uniform extent of movement of said operating means, whereby the result determined by said sensitive means may be indicated, and means for compelling the operation of said operating means only progressively, substantially as specified.

97. In an instrument of precision, a sensitive precision determining means, indicating means independent of said sensitive means, means independent of said sensitive means and having two uniform portions of movement for operating said indicating means, means controlled by said sensitive means for disconnecting said indicating means from said operating means at variable points throughout one of said portions of movement of said operating means, whereby the result determined by said sensitive means may be indicated, means for returning said indicating means to normal position during the other portion of movement of said operating means, and means for compelling the operation of said operating means only progressively, substantially as specified.

98. In an instrument of precision, a control means, a plurality of indicating means, means for operating each of said indicating means, means controlled by said control means for arresting the movement of part of said indicating means, means controlled by the arrested position of one of said indicating means for arresting the unarrested indicating means, and means for compelling the operation of said operating means only progressively, substantially as specified.

99. In an instrument of precision, a control means, a plurality of indicating means, means for operating each of said indicating means, means controlled by said control means for arresting the movement of part of said indicating means, means controlled by the arrested position of one of said indicating means for arresting the unarrested indicating means, means actuated by said operating means for aligning said indicating means, and means for compelling the operation of said operating means only progressively, substantially as specified.

100. Two indicating means each having indicating characters thereon, means for operating said indicating means, means for arresting the movement of one of said indicating means at any of a plurality of points intermediate each indicating character thereon, means for arresting the movement of the unarrested indicating means at a point deter-

mined by the arrested position of the other indicating means, means for aligning the indicating characters on said two indicating means, and means for compelling the operation of said operating means only progressively, substantially as specified.

101. Two indicating means each having indicating characters thereon, means for successively operating said indicating means, means for arresting the movement of the first operated indicating means at any of a plurality of points intermediate each indicating character thereon, means for arresting the movement of the second operated indicating means at a point determined by the arrested position of said first operated indicating means, and means for compelling the operation of said operating means only progressively, substantially as specified.

102. Two indicating means each having indicating characters thereon, the characters upon one of said means being of higher denomination than those on the other of said indicating means, means for operating each of said indicating means, means for arresting the movement of said higher denomination indicating means at any of a plurality of points intermediate the indicating characters thereon, means for arresting the movement of said lower denomination indicating means at the point determined by the arrested position of said higher denomination indicating means, and means for compelling the operation of said operating means only progressively, substantially as specified.

103. An indicating means having a series of characters thereon indicating amounts, a second indicating means having a series of characters thereon indicating the amounts between each character on said first indicating means, means for operating each of said indicating means, means for arresting the movement of said first indicating means at a plurality of points at and between each character thereon, means for arresting the movement of said second indicating means at the point determined by the arrested position of said first indicating means, and means for compelling the operation of said operating means only progressively, substantially as specified.

104. In an instrument of precision, a sensitive control means, indicating means, means for operating said indicating means independent of said sensitive means, means including a movably mounted trigger for arresting the movement of said indicating means at a point determined by said sensitive means, and means for compelling the operation of said operating means only progressively, substantially as specified.

105. In an instrument of precision, a sensitive control means, indicating means, means for operating said indicating means independent of said sensitive means, means

including a movably mounted trigger for arresting the movement of said indicating means at a point determined by said sensitive means, means for varying the sensitivity of said trigger, and means for compelling the operation of said operating means only progressively, substantially as specified.

106. In an instrument of precision, a sensitive control means, a plurality of indicating means, means for operating said indicating means, a plurality of means each including a movably mounted trigger for arresting the movement of said indicating means at points determined by said sensitive means, and means for compelling the operation of said operating means only progressively, substantially as specified.

107. In an instrument of precision, a sensitive control means, means bearing printing characters, independent operating means for said means bearing printing characters, means including a movably mounted trigger for arresting the movement of said means bearing printing characters at points determined by said sensitive means, a ticket, a detail record, means operated by said operating means for printing on said record the previously indicated amount and subsequently printing said ticket with the presently indicated amount at each operation of said operating means, and means for compelling the operation of said operating means only progressively, substantially as specified.

108. In an instrument of precision, a sensitive means, means bearing printing characters, independent operating means for said means bearing printing characters, said operating means having two portions of movement at each operation, a detail record, a ticket, means including a movably mounted trigger for arresting the movement of said means bearing printing characters at points determined by said sensitive means, means whereby in the first portion of movement of said operating means said detail record is printed and the said means bearing said characters returned to their normal position, and in the second portion of movement of said operating means said means bearing said characters are properly positioned and said ticket printed, and means for compelling the operation of said operating means only progressively, substantially as specified.

109. In an instrument of precision, a sensitive precision determining means, indicating means independent of said sensitive means; means independent of said sensitive means, and having a uniform extent of movement at each operation, for operating said indicating means, means controlled by said sensitive means for disconnecting said indicating means from said operating means at different points throughout a uniform ex-

tent of movement of said operating means, whereby the result determined by said sensitive means may be indicated, means for compelling the operation of said operating means only progressively, and means for stopping the operation of said operating means at the end of each operation, substantially as specified.

110. Two indicating means each having indicating characters thereon, means for successively operating said indicating means, means for arresting the movement of the first operated indicating means at any of a plurality of points intermediate each indicating character thereon, means for arresting the movement of the second operated indicating means at a point determined by the arrested position of said first operated indicating means, means for aligning the indicating characters on said two indicating means, means for compelling the operation of said operating means only progressively, and means for stopping the operation of said operating means at the end of each operation, substantially as specified.

111. In an instrument of precision, a sensitive control means, indicating means, means for operating said indicating means independent of said sensitive means, means including a movably mounted trigger for arresting the movement of said indicating means at a point determined by said sensitive means, means for compelling the operation of said operating means only progressively, and means for stopping the operation of said operating means at the end of each operation, substantially as specified.

112. In an instrument of precision, a sensitive control means, means bearing printing characters, an independent operating means for moving said means bearing printing characters to represent the amount corresponding to the position of said sensitive means, a ticket, a detail record, means operated by said operating means for printing said ticket and record at each operation of said operating means, means for compelling the operation of said operating means only progressively, and means for stopping the operation of said operating means at the end of each operation, substantially as specified.

113. In an instrument of precision, a sensitive means, means bearing printing characters, independent operating means for said means bearing printing characters, said operating means having two portions of movement at each operation, a detail record, a ticket; means, including a movably mounted trigger adapted to be brought into contact with said sensitive means, for arresting the movement of said means bearing printing characters at points determined by said sensitive means; means whereby in the first portion of movement of said operating means said detail record is printed and said means

bearing said characters returned to their normal position, and in the second portion of movement of said operating means said means bearing said characters are properly
 5 positioned and said ticket printed; means for compelling the operation of said operating means only progressively, and means for stopping the operation of said operating means at the end of each operation, substantially
 10 as specified.

114. In an instrument of precision, sensitive means, a detent, a member operatively independent of said sensitive means, independent means for operating said member,
 13 means controlled by said sensitive means for determining the point at which said detent may detain said member, means for holding said detent in a nondetaining position, and means controlled by said sensitive means for
 20 releasing said detent holding means, substantially as specified.

115. In an instrument of precision, a detent, a member adapted to be detained by said detent, means for holding said detent in
 25 a nondetaining position, a control means operatively independent of said member, and means intermediate said control means and said holding means for determining the point at which said detent detains said member,
 30 substantially as specified.

116. In an instrument of precision, a detent, a member adapted to be detained by said detent, means for holding said detent in
 35 a nondetaining position, and trigger means for releasing said detent holding means, substantially as specified.

117. In an instrument of precision, a detent, a member adapted to be detained by said detent, means for holding said detent in
 40 a nondetaining position, trigger means for releasing said detent holding means, and means controlled by said trigger means for causing said detent to detain said member, substantially
 45 as specified.

118. In an instrument of precision, a sensitive means, a member, a detent adapted to detain said member, means for holding said detent in a non-detaining position, trigger
 50 means for releasing said detent holding means, and means controlled by said sensitive means for timing the operation of said trigger means, substantially as specified.

119. In an instrument of precision, a sensitive means, a member, a detent adapted to detain said member, means for holding said detent in a non-detaining position, trigger
 55 means for releasing said detent holding means, and a sensitive member adapted to contact with said sensitive means for timing the operation of said trigger means, substantially
 60 as specified.

120. In an instrument of precision, sensitive means, a member, means independent of
 65 said sensitive means for operating said member, means for locking said member, and trig-

ger means controlled by said sensitive means for determining when said locking means locks said member, substantially as specified.

121. In an instrument of precision, sensitive means, a member, means for operating
 70 said member, means for locking said member, and means timed by said sensitive means for controlling the point at which said locking means locks said member, substantially as
 75 specified.

122. In an instrument of precision, means sensitive to forces acting thereon, means for indicating said forces, means independent of
 80 said sensitive means for operating said indicating means, a sensitive member operated by said operating means, and means whereby the cooperation of said sensitive member and said sensitive means determines the extent of
 85 operation of said indicating means by said operating means, substantially as specified.

123. In an instrument of precision, means sensitive to forces acting thereon, means for indicating said forces, means independent
 90 of said sensitive means for operating said indicating means, a sensitive member operated by said operating means, and means whereby instantaneous cooperation of said sensitive member and said sensitive means determines the extent of operation of said indicating
 95 means by said operating means, substantially as specified.

124. In an instrument of precision, means sensitive to forces acting thereon, means for indicating said forces, means independent of
 100 said sensitive means for operating said indicating means, a sensitive member, means whereby the cooperation of said sensitive member and said sensitive means determines the extent of operation of said indicating
 105 means by said operating means, and means for limiting said cooperation at each operation of said operating means, substantially as specified.

125. In an instrument of precision, means sensitive to forces acting thereon, means for indicating said forces, means independent of
 110 said sensitive means for operating said indicating means, a sensitive member, means whereby the cooperation of said sensitive member and said sensitive means determines the extent of operation of said indicating
 115 means by said operating means, means for limiting said cooperation at each operation of said operating means, and means whereby said cooperation is effected and limited by
 120 said operating means, substantially as specified.

126. In an instrument of precision, means sensitive to forces acting thereon, means operatively independent of said sensitive means
 125 for indicating said forces, means independent of said sensitive means for operating said indicating means, a sensitive member, means actuated by said operating means for attaining the co-operation of said sensitive member
 130

tuated by said operating means for moving said sensitive member to contact with said sensitive means, means for actuating said locking means, and means for operating said actuating means upon the attainment of said contact, substantially as specified.

137. In an instrument of precision, means sensitive to forces acting thereon, means operatively independent of said sensitive means for indicating said forces, means independent of said sensitive means for operating said indicating means, means for locking said indicating means, a sensitive member, means actuated by said operating means for moving said sensitive member to contact with said sensitive means, means for actuating said locking means, means for operating said actuating means upon the attainment of said contact, and means whereby said contact is without influence upon the sensitiveness of said sensitive means, substantially as specified.

138. In an instrument of precision, means sensitive to forces acting thereon, means operatively independent of said sensitive means for indicating said forces, means independent of said sensitive means for operating said indicating means, means for locking said indicating means, a sensitive member, means actuated by said operating means for moving said sensitive member to contact with said sensitive means, means for actuating said locking means, a detent for detaining said actuating means from locking said locking means, and means for releasing said detent upon the attainment of said contact, substantially as specified.

139. In an instrument of precision, means sensitive to forces acting thereon, means operatively independent of said sensitive means for indicating said forces, means independent of said sensitive means for operating said indicating means, means for locking said indicating means, a sensitive member, means actuated by said operating means for moving said sensitive member to contact with said sensitive means, means for actuating said locking means, a detent for detaining said actuating means from locking said locking means, means for releasing said detent upon the attainment of said contact, and means whereby said contact is without influence upon the sensitiveness of said sensitive means, substantially as specified.

140. In an instrument of precision, means sensitive to forces acting thereon, means operatively independent of said sensitive means for indicating said forces, means independent of said sensitive means for operating said indicating means, means for locking said indicating means, a sensitive member, means actuated by said operating means for moving said sensitive member to contact with said sensitive means, means for actuating said locking means, trigger means for re-

straining said actuating means for locking said locking means, and means for releasing said trigger means upon the attainment of said contact, substantially as specified.

141. In an instrument of precision, means sensitive to forces acting thereon, means operatively independent of said sensitive means for indicating said forces, means independent of said sensitive means for operating said indicating means, means for locking said indicating means, a sensitive member, means actuated by said operating means for moving said sensitive member to contact with said sensitive means, means for actuating said locking means, trigger means for restraining said actuating means from locking said locking means, means for releasing said trigger means upon the attainment of said contact, and means whereby said contact is without influence upon the sensitiveness of said sensitive means, substantially as specified.

142. In an instrument of precision, means sensitive to forces acting thereon, means operatively independent of said sensitive means for indicating said forces, means independent of said sensitive means for operating said indicating means, means for locking said indicating means, a sensitive member, means actuated by said operating means for moving said sensitive member to contact with said sensitive means, means for limiting said contact of said sensitive member and said sensitive means, and means for actuating said locking means during said contact, substantially as specified.

143. In an instrument of precision, means sensitive to forces acting thereon, a cam operated by said sensitive means proportionate to the forces acting thereon, means operatively independent of said sensitive means for indicating said forces, means independent of said sensitive means for operating said indicating means, a sensitive member, means actuated by said operating means for relatively moving said sensitive member and said cam, means whereby the extent of operation of said indicating means by said operating means is determined by the contact of said sensitive member with the cam surface of said cam, and means whereby said contact is without influence upon the sensitiveness of said sensitive means, substantially as specified.

144. In an instrument of precision, means sensitive to forces acting thereon, a cam operated by said sensitive means proportionate to the forces acting thereon, means operatively independent of said sensitive means for indicating said forces, means independent of said sensitive means for operating said indicating means, a sensitive member, means actuated by said operating means for moving said sensitive member substantially at right-angles to the cam surface of said cam

and toward said cam, and means whereby the point of contact of said sensitive member with the cam surface of said cam determines the extent of operation of said indicating means by said operating means, substantially as specified.

145. In an instrument of precision, means sensitive to forces acting thereon, a revoluble cam operated by said sensitive means proportionate to the forces acting thereon, means operatively independent of said sensitive means for indicating said forces, means independent of said sensitive means for operating said indicating means, a sensitive member, means actuated by said operating means for moving said sensitive member to contact with the cam surface of said cam, means whereby said contact determines the extent of operation of said indicating means by said operating means, and means whereby said contact is without influence upon the sensitiveness of said sensitive means, substantially as specified.

146. In an instrument of precision, means sensitive to forces acting thereon, a revoluble cam operated by said sensitive means proportionate to the forces acting thereon, means operatively independent of said sensitive means for indicating said forces, means independent of said sensitive means for operating said indicating means, a sensitive member, means actuated by said operating means for moving said sensitive member radially toward said cam to contact with the cam surface of said cam, means whereby said contact determines the extent of operation of said indicating means by said operating means, and means for instantaneously breaking the said contact, substantially as specified.

147. In an instrument of precision, means sensitive to forces acting thereon, a revoluble cam operated by said sensitive means proportionate to the forces acting thereon, means operatively independent of said sensitive means for indicating said forces, means independent of said sensitive means for operating said indicating means, a sensitive member, means actuated by said operating means and moving said sensitive member radially toward said cam to contact with the cam surface of said cam, means for locking said indicating means, and means for actuating said locking means upon the attainment of said contact, substantially as specified.

148. In an instrument of precision, means sensitive to forces acting thereon, a revoluble cam operated by said sensitive means proportionate to the forces acting thereon, means operatively independent of said sensitive means for indicating said forces, means independent of said sensitive means for operating said indicating means, a sensitive member, means actuated by said operating means and moving said sensitive member radially toward said cam to contact with the cam surface of said cam, means for locking said indi-

cating means, and means for limiting said contact, substantially as specified.

149. In an instrument of precision, means sensitive to forces acting thereon, a revoluble cam operated by said sensitive means proportionate to the forces acting thereon, means operatively independent of said sensitive means for indicating said forces, means independent of said sensitive means for operating said indicating means, a sensitive member, means actuated by said operating means and moving said sensitive member radially toward said cam to contact with the cam surface of said cam, means for locking said indicating means, means for actuating said locking means upon the attainment of said contact, and means for instantaneously breaking said contact, substantially as specified.

150. In an instrument of precision, means sensitive to forces acting thereon, a revoluble cam operated by said sensitive means proportionate to the forces acting thereon, means operatively independent of said sensitive means for indicating said forces, means independent of said sensitive means for operating said indicating means, a sensitive member, means actuated by said operating means and moving said sensitive member radially toward said cam to contact with the cam surface of said cam, means for locking said indicating means, trigger means, means for actuating said trigger means upon said contact of said sensitive member and said cam, and means for actuating said locking means upon the said actuation of said trigger means, substantially as specified.

151. In an instrument of precision, means sensitive to forces acting thereon, a revoluble cam operated by said sensitive means proportionate to the forces acting thereon, means operatively independent of said sensitive means for indicating said forces, means independent of said sensitive means for operating said indicating means, a sensitive member, means actuated by said operating means and moving said sensitive member radially toward said cam to contact with the cam surface of said cam, means for locking said indicating means; trigger means, intermediate said sensitive member and said locking means; and means whereby said trigger means and said locking means are actuated upon the said contact of said sensitive member and said cam, substantially as specified.

152. In an instrument of precision, means sensitive to forces acting thereon, means operatively independent of said sensitive means for indicating said forces, a sensitive member, means independent of said sensitive means for relatively operating said indicating means and said sensitive member, means for locking said indicating means, means whereby said sensitive member and said sensitive means may co-operate, and

means for actuating said locking means upon said co-operation, substantially as specified.

153. In an instrument of precision, means sensitive to forces acting thereon, means
 5 operatively independent of said sensitive means for indicating said forces, a sensitive member, means independent of said sensitive
 10 means for relatively operating said indicating means and said sensitive member, means whereby said sensitive member and said sensitive means may co-operate, means for actuating said locking means upon said co-operation, and means whereby said co-operation
 15 is without influence upon the sensitiveness of said sensitive means, substantially as specified.

154. In an instrument of precision, precision means, an indicator therefor; a detent
 20 and a member having teeth, one connected to said indicator and the other mounted independent thereof; means for decreasing the distance between said teeth and detent relatively to the extent of the operation of said
 25 indicator, means independent of said precision means for driving said indicator and said detent, and means whereby said detent engages one of said teeth at a predetermined point, substantially as specified.

30 155. In an instrument of precision an indicator, a member having teeth movable therewith, means for engaging said teeth and locking said member, means for driving said indicator, and means whereby the distance
 35 between said teeth and said engaging means is decreased relative to the extent of movement of said member, substantially as specified.

156. In an instrument of precision, a member bearing characters, a member having
 40 teeth, a locking member, one of said last two named members being connected to said first member, means for driving said first named member, means for decreasing the distance between said toothed and locking
 45 members according to the extent of operation of said first member, and means for causing engagement of said toothed and locking members at predetermined points, substantially as specified.

157. In an instrument of precision, indicating means; a detent member and a member having teeth, one of said members being
 50 connected to the movable part of said indicating means and the other mounted independent thereof; means for decreasing the distance between said detent and toothed member according to the extent of movement of the movable part of said indicating means; means for driving said indicating means; and means for causing the engagement of said detent and toothed member and locking said indicating means; substantially as specified.

158. In an instrument of precision, indicating means; a detent member and a mem-

ber having teeth, one of said members being connected to the movable part of said indicating means and the other mounted independent thereof; said teeth being spaced relative to the indications upon said indicating
 70 means, and said teeth being progressively nearer said detent, means for driving said indicating means; and means for causing the engagement of said detent and toothed member and locking said indicating means; substantially as specified.

159. In an instrument of precision, an indicating means; a detent member, a member having teeth, one of said members being connected to the movable part of said indicating means and the other member being mounted independent of said indicating means; said teeth on said member being spaced relatively to the indications upon said indicating
 80 means; the cooperating faces of said detent and toothed members being relatively eccentric; means for driving said indicating means; and means for causing the engagement of said co-operating faces of said detent and toothed members and locking said indicating means; substantially as specified.

160. In an instrument of precision, a sensitive means, an indicating means, a member bearing teeth, a locking member, one of said last two named members being connected to a movable part of said indicating means, means for driving said indicating means, means for decreasing the distance between said toothed and locking members according to the extent of movement of the movable part of said indicating means, and means controlled by said sensitive means for causing the engagement of said toothed and locking members, substantially as specified.

161. In an instrument of precision, two indicating means; two detent members, and two members having teeth; one of each of said last two named members being movably connected to their respective indicating means and the other of each of said last two named members being mounted independent thereof; said teeth on one of said members being of progressive depth; operating means; means for causing the engagement of one of said detent members with one of said teeth of progressive depth; means for locking said member having teeth of progressive depth at said point of said engagement; means whereby said detent members are relatively operated; and means whereby said engagement controls the tooth of said other toothed member which is engaged by said other detent member, substantially as specified.

162. In an instrument of precision, two indicating means; two detent members, and two members having teeth; one of each of said last two named members being movably connected to their respective indicating means and the other of each of said last two named members being mounted independent there-

of; said teeth on one of said members being of progressive depth; operating means; means for causing the engagement of one of said detent members with one of said teeth of progressive depth; means for locking said member having teeth of progressive depth at said point of said engagement; means whereby said detent members are relatively operated; means whereby said engagement controls the tooth of said other toothed member which is engaged by said other detent member, and means for aligning said two indicating means, substantially as specified.

163. In an instrument of precision, two indicating means, each bearing indications, means for operating said indicating means, means for arresting one of said indicating means at points at, and between the indications thereon; means, controlled by the point at which said first named means arrests one of said indicating means, for arresting said other indicating means, substantially as specified.

164. In an instrument of precision, two indicating means; two detent members and two members having teeth; one of each of said last two named members being movably connected to their respective indicating means and the other of each of said last two named members being mounted independent thereof; said teeth on one of said members being of progressive depth; operating means; a plurality of fine teeth on said member provided with teeth of progressive depth, for each tooth of progressive depth thereon; a supplemental detent for engaging said fine teeth; means for controlling the point of contact of said supplemental detent and said fine teeth; means for causing the engagement of one of said detent members with one of said teeth of progressive depth; and means whereby the point of said engagement controls the point of contact of said other detent and said other toothed member, substantially as specified.

165. In an instrument of precision, a sensitive means, an indicating means, a member bearing teeth, a locking member, one of said last two named members being connected to a movable part of said indicating means, means independent of said sensitive means for driving said indicating means, means for decreasing the distance between said toothed and locking members according to the extent of movement of the moveable part of said indicating means, means controlled by said sensitive means for causing the engagement of said toothed and locking members, and means for compelling the progressive operation of said driving means, substantially as specified.

166. In an instrument of precision, a sensitive means, an indicating means, a member bearing teeth, a locking member, one of said last two named members being connected

to a movable part of said indicating means, means independent of said sensitive means for driving said indicating means, means for decreasing the distance between said toothed and locking members according to the extent of movement of the movable part of said indicating means, means controlled by said sensitive means for causing the engagement of said toothed and locking members, means for compelling the progressive operation of said driving means, and means for limiting each operation of said driving means to a definite cycle, substantially as specified.

167. In an instrument of precision, a sensitive means, an indicating means, a member bearing teeth, a locking member, one of said last two named members being connected to a movable part of said indicating means, means independent of said sensitive means for driving said indicating means, means for decreasing the distance between said toothed and locking members according to the extent of movement of the movable part of said indicating means, means controlled by said sensitive means for causing the engagement of said toothed and locking members, means for compelling the progressive operation of said driving means, and means for locking said driving means at the end of its cycle of operation, substantially as specified.

168. In an instrument of precision, a sensitive means, an indicating means, a member bearing teeth, a locking member, one of said last two named members being connected to a movable part of said indicating means, means independent of said sensitive means for driving said indicating means, means for decreasing the distance between said toothed and locking members according to the extent of movement of the movable part of said indicating means, means controlled by said sensitive means for causing the engagement of said toothed and locking members, and means whereby said controlled means is without practical effect upon the action of said sensitive means, substantially as specified.

169. In an instrument of precision, a sensitive means, an indicating means, a member bearing teeth, a locking member, one of said last two named members being connected to a movable part of said indicating means, means independent of said sensitive means for driving said indicating means, means for decreasing the distance between said toothed and locking members according to the extent of movement of the movable part of said indicating means, means controlled by said sensitive means for causing the engagement of said toothed and locking members, means whereby said controlled means is without practical effect upon the action of said sensitive means, means for compelling the progressive operation of said driving means, and means for locking said driving

means at the end of each of its operating cycles, substantially as specified.

170. In an instrument of precision, means sensitive to forces acting thereon, means operatively independent of said sensitive means for printing the amounts of said forces, means independent of said sensitive means for operating said printing means; a member bearing teeth, a locking member, one of said last two named members being connected to a movable part of said printing means, means for decreasing the distance between said toothed and locking members according to the extent of movement of said movable part of said printing means, and means controlled by said sensitive means for causing the engagement of said toothed and locking members, substantially as specified.

171. In an instrument of precision, means sensitive to forces acting thereon, means operatively independent of said sensitive means for printing the amounts of said forces, means independent of said sensitive means for operating said printing means; a member bearing teeth, a locking member, one of said last two named members being connected to a movable part of said printing means, means for decreasing the distance between said toothed and locking members according to the extent of movement of said movable part of said printing means, means controlled by said sensitive means for causing the engagement of said toothed and locking members, and means for compelling the progressive operation of said operating means, substantially as specified.

172. In an instrument of precision, means sensitive to forces acting thereon, means operatively independent of said sensitive means for printing the amounts of said forces, means independent of said sensitive means for operating said printing means; a member bearing teeth, a locking member, one of said last two named members being connected to a movable part of said printing means, means for decreasing the distance between said toothed and locking members according to the extent of movement of said movable part of said printing means, means controlled by said sensitive means for causing the engagement of said toothed and locking members, means for compelling the progressive operation of said operating means, and means for locking said operating means at the end of each of its operating cycles, substantially as specified.

173. In an instrument of precision, a sensitive means, an indicating means, a member bearing teeth, a locking member, one of said last two named members being connected to a movable part of said indicating means, means independent of said sensitive means for driving said indicating means, means for decreasing the distance between said toothed and locking members according to the extent

of movement of the movable part of said indicating means, means controlled by said sensitive means for causing the engagement of said toothed and locking members, and means whereby said controlled means is without effect upon the action of said sensitive means, substantially as specified.

174. In an instrument of precision, a sensitive means, an indicating means, a member bearing teeth, a locking member, one of said last two named members being connected to a movable part of said indicating means, means independent of said sensitive means for driving said indicating means, means for decreasing the distance between said toothed and locking members according to the extent of movement of the movable part of said indicating means, means controlled by said sensitive means for causing the engagement of said toothed and locking members, means whereby said controlled means is without effect upon the action of said sensitive means, means for compelling the progressive operation of said operating means, and means for limiting each operation of said operating means to a definite cycle, substantially as specified.

175. In an instrument of precision, a sensitive means, an indicating means, a member bearing teeth, a locking member, one of said last two named members being connected to a movable part of said indicating means, means independent of said sensitive means for driving said indicating means, means for decreasing the distance between said toothed and locking members according to the extent of movement of the movable part of said indicating means, means controlled by said sensitive means for causing the engagement of said toothed and locking members, means whereby said controlled means is without effect upon the action of said sensitive means, means for compelling the progressive operation of said operating means, and means for locking said operating means at the end of each of its operating cycles, substantially as specified.

176. In an instrument of precision, two indicating means, each bearing indications, means for operating said indicating means; means for arresting one of said indicating means at points at, and between, the indications thereon; means, controlled by the arrested position of said arrested indicating means, for arresting said other indicating means, means for compelling the progressive operation of said operating means, and means for limiting each operation of said operating means to a definite cycle, substantially as specified.

177. In an instrument of precision, two indicating means, each bearing indications, means for operating said indicating means; means for arresting one of said indicating means at points at, and between, the indica-

tions thereon; means, controlled by the arrested position of said arrested indicating means, for arresting said other indicating means; means for compelling the progressive operation of said operating means, and means
5 for locking said operating means at the end of each cycle of its operation, substantially as specified.

178. In an instrument of precision, means
10 sensitive to forces acting thereon, two indicating means operatively independent of said sensitive means for indicating said forces, means independent of said sensitive means for operating said two indicating means,
15 means controlled by said sensitive means for arresting one of said indicating means at points at and between the indications thereon; means, controlled by the arrested position of said arrested indicating means for arresting said other indicating means, and
20 means whereby said means controlled by said sensitive means is without effect upon the action of said sensitive means, substantially as specified.

179. In an instrument of precision, two
25 indicating means, each bearing indications, means for operating said indicating means, means for arresting one of said indicating means at points at and between the indications thereon; means, controlled by the arrested position of said arrested indicating
30 means, for arresting said other indicating means, and means actuated by said operating means for aligning said two arrested indicating means, substantially as specified.
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180. In an instrument of precision, two indicating means, each bearing indications, means for operating said indicating means, means for arresting one of said indicating
40 means at points at and between the indications thereon; means, controlled by the arrested position of said arrested indicating means, for arresting said other indicating means, means actuated by said operating
45 means for aligning said two arrested indicating means, means for compelling the progressive operation of said operating means, and means for limiting each operation of said operating means to a definite cycle, substantially as specified.
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181. In an instrument of precision, two indicating means, each bearing indications, means for operating said indicating means, means for arresting one of said indicating
55 means at points at and between the indications thereon; means, controlled by the arrested position of said arrested indicating means, for arresting said other indicating means, means actuated by said operating
60 means for aligning said two arrested indicating means, means for compelling the progressive operation of said operating means, and means for locking said operating means at the end of each cycle of its operation, substantially as specified.
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182. In an instrument of precision, means sensitive to forces acting thereon, means operatively independent of said sensitive means for indicating said forces, means independent of said sensitive means for operating said
70 indicating means, means controlled by said sensitive means for determining the extent of movement of said indicating means by said operating means, means whereby said controlled means is without effect upon the
75 action of said sensitive means, and means for locking said indicating means at the point determined by said controlled means, substantially as specified.

183. In an instrument of precision, means
80 sensitive to forces acting thereon, means operatively independent of said sensitive means for indicating said forces, means independent of said sensitive means for operating said indicating means, means controlled by said
85 sensitive means for determining the extent of movement of said indicating means by said operating means, means whereby said controlled means is without effect upon the action of said sensitive means, means for locking said indicating means, and means
90 for actuating said locking means at the point determined by said controlled means, substantially as specified.

184. In an instrument of precision, means
95 sensitive to forces acting thereon, means operatively independent of said sensitive means for indicating said forces, means independent of said sensitive means for operating said indicating means, means for
100 compelling the progressive operation of said operating means, means controlled by said sensitive means for determining the extent of movement of said indicating means by said operating means, and means whereby
105 said controlled means is without effect upon the action of said sensitive means, substantially as specified.

185. In an instrument of precision, means
110 sensitive to forces acting thereon, means operatively independent of said sensitive means for indicating said forces, means independent of said sensitive means for operating said indicating means, means controlled by said
115 sensitive means for determining the extent of movement of said indicating means by said operating means, means whereby said controlled means is without effect upon the action of said sensitive means, and means for locking said operating means at the end of
120 each cycle of its operation, substantially as specified.

186. In an instrument of precision, two indicating means, means for driving said indicating means, a detent for each of said
125 indicating means, a toothed member movable with each of said indicating means, means whereby the distance between one of said toothed members and its detent is decreased relative to the extent of movement
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of its said indicating means, and means for actuating said detent members to engage said toothed members, substantially as specified.

187. In an instrument of precision, a first, second and third indicating means; a toothed member associated with each of said indicating means; a first detent for engaging said toothed member associated with said first indicating means; a second and a third detent; means whereby the point of engagement of said second detent with its said toothed member, associated with said second indicating means, determines the point of engagement of said third detent with its said toothed member associated with said third indicating means; means for operating said indicating means, and means for actuating said detents; substantially as specified.

188. In an instrument of precision; a first, second and third indicating means; a toothed member associated with each of said indicating means; a first detent for engaging said toothed member associated with said first indicating means; a second and a third detent; means whereby the point of engagement of said second detent with its said toothed member associated with said second indicating means determines the point of engagement of said third detent with its said toothed member associated with said third indicating means, means for operating said indicating means, means for actuating said detents; and means for compelling the progressive operation of said operating means, substantially as specified.

189. In an instrument of precision; means sensitive to forces acting thereon; a first, second and third indicating means, for indicating said forces; a toothed member associated with each of said indicating means; a first detent for engaging said toothed member associated with said first indicating means; a second and a third detent, means whereby the point of engagement of said second detent with its said toothed member associated with said second indicating means determines the point of engagement of said third detent with its said toothed member associated with said third indicating means, means for operating said indicating means, means for actuating said detents; and means controlled by said sensitive means for actuating said first and second detents, substantially as specified.

190. In an instrument of precision; means sensitive to forces acting thereon; a first, second and third indicating means, for indicating said forces; a toothed member associated with each of said indicating means; a first detent for engaging said toothed member associated with said first indicating means; a second and a third detent; means whereby the point of engagement of said second detent with its said toothed member

associated with said second indicating means determines the point of engagement of said third detent with its said toothed member associated with said third indicating means, means for operating said indicating means, means for actuating said detents; means controlled by said sensitive means for actuating said first and second detents, and means for compelling the progressive operation of said operating means, substantially as specified.

191. In an instrument of precision; means sensitive to forces acting thereon; a first, second and third indicating means for indicating said forces; a toothed member associated with each of said indicating means; a first detent for engaging said toothed member associated with said first indicating means; a second and a third detent; means whereby the point of engagement of said second detent with its said toothed member associated with said second indicating means determines the point of engagement of said third detent with its said toothed member associated with said third indicating means, means for operating said indicating means, means for actuating said detents; means controlled by said sensitive means for actuating said first and second detents, means for compelling the progressive operation of said operating means, and means for locking said operating means at the end of its cycle of operation, substantially as specified.

192. In an instrument of precision; means sensitive to forces acting thereon; a first, second and third indicating means for indicating said forces; a toothed member associated with each of said indicating means; a first detent for engaging said toothed member associated with said first indicating means; a second and a third detent; means whereby the point of engagement of said second detent with its said toothed member associated with said second indicating means determines the point of engagement of said third detent with its said toothed member associated with said third indicating means, means for operating said indicating means, means for actuating said detents; means controlled by said sensitive means for actuating said first and second detents, and means whereby said controlled means does not impair the action of said sensitive means, substantially as specified.

193. In an instrument of precision; means sensitive to forces acting thereon; a first, second and third indicating means for indicating said forces; a toothed member associated with each of said indicating means; a first detent for engaging said toothed member associated with said first indicating means; a second and a third detent, means whereby the point of engagement of said second detent with its said toothed member associated with said second indicating means determines the point of engagement of said third detent with its said toothed member

associated with said third indicating means, means for operating said indicating means, means for actuating said detents; means controlled by said sensitive means for actuating
 5 said first and second detents, means whereby said controlled means does not impair the action of said sensitive means, and means for compelling the progressive operation of said operating means, substantially as specified.

10 194. In an instrument of precision; means sensitive to forces acting thereon; a first, second and third indicating means for indicating said forces; a toothed member associated with each of said indicating means; a first
 15 detent for engaging said toothed member associated with said first indicating means; a second and a third detent; means whereby the point of engagement of said second detent with its said toothed member associated with
 20 said second indicating means determines the point of engagement of said third detent with its said toothed member associated with said third indicating means, means for operating said indicating means, means for actuating
 25 said detents; means controlled by said sensitive means for actuating said first and second detents, means whereby said controlled means does not impair the action of said sensitive means, means for compelling the progressive
 30 operation of said operating means, and means for locking said operating means at the end of its operating cycle, substantially as specified.

35 195. In an instrument of precision, a first, second and third indicating means; a toothed member associated with each of said indicating means; a first detent for engaging said toothed member associated with said first
 40 indicating means; the teeth of said toothed member, associated with said second indicating means, being of progressively increasing depth; a second and a third detent; means whereby the depth of the engagement of said
 45 second detent with said teeth of said toothed member associated with said second indicating means determines the point of engagement of said third detent with its said toothed member associated with said third indicating
 50 means; means for operating said indicating means; and means for actuating said detents; substantially as specified.

55 196. In an instrument of precision, a first, second and third indicating means; a toothed member associated with each of said indicating means; a first detent for engaging said toothed member associated with said first
 60 indicating means; the teeth of said toothed member, associated with said second indicating means, being of progressively increasing depth; a second and a third detent; means whereby the depth of the engagement of said
 65 second detent with said teeth of said toothed member associated with said second indicating means determines the point of engagement of said third detent with its said toothed

member associated with said third indicating means; means for operating said indicating means; means for actuating said detents; and means for compelling the progressive operation of said operating means, substantially
 70 as specified.

197. In an instrument of precision, a first, second and third indicating means; a toothed member associated with each of said indicating means; a first detent for engaging said
 75 toothed member associated with said first indicating means; the teeth of said toothed member, associated with said second indicating means, being of progressively increasing depth; a second and a third detent;
 80 means whereby the depth of the engagement of said second detent with said teeth of said toothed member associated with said second indicating means determines the point of engagement of said third detent with its said
 85 toothed member associated with said third indicating means; means for operating said indicating means; means for actuating said detents; means for compelling the progressive operation of said operating means, and
 90 means for stopping said operating means at the end of its cycle of operation, substantially as specified.

198. In an instrument of precision, a first, second and third indicating means; a toothed member associated with each of said indicating means; a first detent for engaging said
 95 toothed member associated with said first indicating means; the teeth of said toothed member, associated with said second indicating means, being of progressively increasing depth; a second and a third detent;
 100 means whereby the depth of the engagement of said second detent with said teeth of said toothed member associated with said second indicating means determines the point of engagement of said third detent with its
 105 said toothed member associated with said third indicating means; means for operating said indicating means; means for actuating said detents; means for compelling the progressive operation of said operating means, means for stopping said operating means at
 110 the end of its cycle of operation, and means for releasing said stopping means at the beginning of the operating cycle of said operating means, substantially as specified.

199. In an instrument of precision, means sensitive to forces acting thereon; a first, second and third indicating means for indicating said forces; a toothed member associated with each of said indicating means;
 120 a first detent for engaging said toothed member associated with said first indicating means; the teeth of said toothed member, associated with said second indicating means, being of progressively increasing depth; a second and a third detent; means
 125 whereby the depth of the engagement of said second detent with said teeth of said toothed
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member associated with said second indicating means determines the point of engagement of said third detent with its said toothed member associated with said third indicating means; means for operating said indicating means; and means controlled by said sensitive means for actuating said detents; substantially as specified.

200. In an instrument of precision, means sensitive to forces acting thereon; a first, second and third indicating means for indicating said forces; a toothed member associated with each of said indicating means; a first detent for engaging said toothed member associated with said first indicating means; the teeth of said toothed member, associated with said second indicating means, being of progressively increasing depth; a second and a third detent; means whereby the depth of the engagement of said second detent with said teeth of said toothed member associated with said second indicating means determines the point of engagement of said third detent with its said toothed member associated with said third indicating means; means for operating said indicating means; means controlled by said sensitive means for actuating said detents; and means for compelling the progressive operation of said operating means, substantially as specified.

201. In an instrument of precision, means sensitive to forces acting thereon; a first, second and third indicating means for indicating said forces; a toothed member associated with each of said indicating means; a first detent for engaging said toothed member associated with said first indicating means; the teeth of said toothed member, associated with said second indicating means, being of progressively increasing depth; a second and a third detent; means whereby the depth of the engagement of said second detent with said teeth of said toothed member associated with said second indicating means determines the point of engagement of said third detent with its said toothed member associated with said third indicating means; means for operating said indicating means; means controlled by said sensitive means for actuating said detents; and means for stopping said operating means at the end of its cycle of operation, substantially as specified.

202. In an instrument of precision, a first, second and third indicating means; a toothed member associated with each of said indicating means; a first detent for engaging said toothed member associated with said first indicating means; the teeth of said toothed member, associated with said second indicating means, being of progressively increasing depth; a second and a third detent; means whereby the depth of the engagement of said second detent with said teeth of said toothed

member associated with said second indicating means determines the point of engagement of said third detent with its said toothed member associated with said third indicating means; means for operating said indicating means; means for actuating said detents; means for compelling the progressive operation of said operating means, means for stopping said operating means at the end of its cycle of operation, means for releasing said stopping means at the beginning of the operating cycle of said operating means, and means whereby said controlled means does not impair the action of said sensitive means, substantially as specified.

203. In an instrument of precision, means sensitive to forces acting thereon; a first, second and third indicating means for indicating said forces; a toothed member associated with each of said indicating means; a first detent for engaging said toothed member associated with said first indicating means; the teeth of said toothed member, associated with said second indicating means, being of progressively increasing depth; a second and a third detent; means whereby the depth of the engagement of said second detent with said teeth of said toothed member associated with said second indicating means determines the point of engagement of said third detent with its said toothed member associated with said third indicating means; means for operating said indicating means; means controlled by said sensitive means for actuating said detents; means for compelling the progressive operation of said operating means; means for releasing said stopping means at the beginning of the operating cycle of said operating means, means for stopping said operating means at the end of its cycle of operation, and means for returning said indicating means to normal position, substantially as specified.

204. In an instrument of precision, means sensitive to forces acting thereon, means for indicating said forces; means independent of said sensitive means for operating said indicating means; means operatively connected to said indicating means and extending towards said sensitive means a distance relative to the extent of the indicating movement of said indicating means; and means controlled by said sensitive means, and intermediate said sensitive means and said extending means, for determining the extent of said operation of said indicating means, substantially as specified.

205. In an instrument of precision, means sensitive to forces acting thereon, means for indicating said forces; means independent of said sensitive means for operating said indicating means; means operatively connected to said indicating means and extending towards said sensitive means a distance

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5) means, for determining the extent of said operation of said indicating means; and means for compelling the progressive operation of said operating means; substantially as specified.

10 206. In an instrument of precision, means
sensitive to forces acting thereon, means for
indicating said forces; means independent
of said sensitive means for operating said
15 indicating means; means operatively con-
nected to said indicating means and extend-
ing towards said sensitive means a distance
relative to the extent of the indicating move-
ment of said indicating means; means con-
20 trolled by said sensitive means, and interme-
diate said sensitive means and said extending
means, for determining the extent of said
operation of said indicating means; means for
compelling the progressive operation of said
25 operating means; and means for stopping
said operating means at the end of its operat-
ing cycle; substantially as specified.

207. In an instrument of precision, means sensitive to forces acting thereon, means for indicating said forces; means independent of said sensitive means for operating said indicating means; means operatively connected to said indicating means and extending towards said sensitive means a distance relative to the extent of the indicating movement of said indicating means; means controlled by said sensitive means, and intermediate said sensitive means and said extending means, for determining the extent of said operation of said indicating means; means for compelling the progressive operation of said operating means; means for stopping said operating means at the end of its operating cycle; and means for releasing said stopping means at the beginning of the operating cycle of said operating means; substantially as specified.

208. In an instrument of precision, means sensitive to forces acting thereon, means for indicating said forces; means independent of said sensitive means for operating said indicating means; means operatively connected to said indicating means and extending towards said sensitive means a distance relative to the extent of the indicating movement of said indicating means; means controlled by said sensitive means, and intermediate said sensitive means and said extending means, for determining the extent of said operation of said indicating means; and means whereby said controlled means does not impair the action of said sensitive means, substantially as specified.

209. In an instrument of precision, means sensitive to forces acting thereon, means for indicating said forces, means independent of
65 said sensitive means for operating said indi-

cating means; means operatively connected to
 said indicating means and extending towards
 said sensitive means a distance relative to
 the extent of the indicating movement of said
 indicating means; means controlled by said 70
 sensitive means, and intermediate said sensi-
 tive means and said extending means, for de-
 termining the extent of said operation of said
 indicating means; means whereby said con-
 trolled means does not impair the action of 75
 said sensitive means, and means for compel-
 ling the progressive operation of said operat-
 ing means, substantially as specified.

210. In an instrument of precision, means sensitive to forces acting thereon, means for 80 indicating said forces; means independent of said sensitive means for operating said indicating means; means operatively connected to said indicating means and extending towards said sensitive means a distance relative to the 85 extent of the indicating movement of said indicating means; means controlled by said sensitive means, and intermediate said sensitive means and said extending means, for determining the extent of said operation of 90 said indicating means, trigger means on said extending means; and means controlled by said sensitive means for operating said trigger means and determining the extent of said operation of said indicating means; substan- 95 tially as specified.

211. In an instrument of precision, means sensitive to forces acting thereon, means for indicating said forces; means independent of said sensitive means for operating said indicating means; means operatively connected to said indicating means and extending towards said sensitive means a distance relative to the extent of the indicating movement of said indicating means; means controlled by said sensitive means, and intermediate said sensitive means and said extending means, for determining the extent of said operation of said indicating means, trigger means on said extending means; means controlled by said sensitive means for operating said trigger means and determining the extent of said operation of said indicating means, and means whereby said control means does not impair the action of said sensitive means, substantially as specified.

212. In an instrument of precision, means sensitive to forces acting thereon, means for indicating said forces; means independent of said sensitive means for operating said 120 indicating means; means operatively connected to said indicating means and extending towards said sensitive means a distance relative to the extent of the indicating movement of said indicating means; means controlled by said sensitive means, and intermediate said sensitive means and said extending means, for determining the extent of said operation of said indicating means, trigger means on said actuated means; 130

means controlled by said sensitive means for operating said trigger means and determining the extent of said operation of said indicating means, means whereby said controlled means does not impair the action of said sensitive means, and means for compelling the progressive operation of said operating means, substantially as specified.

213. In an instrument of precision, means sensitive to forces acting thereon, means for indicating said forces; means independent of said sensitive means for operating said indicating means; means operatively connected to said indicating means and extending towards said sensitive means a distance relative to the extent of the indicating movement of said indicating means; means controlled by said sensitive means, and intermediate said sensitive means and said extending means, for determining the extent of said operation of said indicating means, trigger means on said extending means; means controlled by said sensitive means for operating said trigger means and determining the extent of said operation of said indicating means; and means for stopping said operating means at the end of its operating cycle, substantially as specified.

214. In an instrument of precision, means sensitive to forces acting thereon, means for indicating said forces; means independent of said sensitive means for operating said indicating means; means operatively connected to said indicating means and extending towards said sensitive means a distance relative to the extent of the indicating movement of said indicating means; means controlled by said sensitive means, and intermediate said sensitive means and said extending means, for determining the extent of said operation of said indicating means, trigger means on said extending means; means controlled by said sensitive means for operating said trigger means and determining the extent of said operation of said indicating means; means for stopping said operating means at the end of its operating cycle, and means for releasing said stopping means at the beginning of the operating cycle of said operating means, substantially as specified.

215. In an instrument of precision, means sensitive to forces acting thereon, means for indicating said forces; means independent of said sensitive means for operating said indicating means; means operatively connected to said indicating means and extending towards said sensitive means a distance relative to the extent of the indicating movement of said indicating means; means controlled by said sensitive means, and intermediate said sensitive means and said extending means, for determining the extent of said operation of said indicating means, means for locking said indicating means, and means for actuating said locking means at points de-

termined by said controlled means, substantially as specified.

216. In an instrument of precision, means sensitive to forces acting thereon, means for indicating said forces; means independent of said sensitive means for operating said indicating means; means operatively connected to said indicating means and extending towards said sensitive means a distance relative to the extent of the indicating movement of said indicating means; means controlled by said sensitive means, and intermediate said sensitive means and said extending means, for determining the extent of said operation of said indicating means, means for locking said indicating means, means for actuating said locking means at points determined by said controlled means, and means for compelling the progressive operation of said operating means, substantially as specified.

217. In an instrument of precision, means sensitive to forces acting thereon, means for indicating said forces; means independent of said sensitive means for operating said indicating means; means operatively connected to said indicating means and extending towards said sensitive means a distance relative to the extent of the indicating movement of said indicating means; means controlled by said sensitive means, and intermediate said sensitive means and said extending means, for determining the extent of said operation of said indicating means, means for locking said indicating means, means for actuating said locking means at points determined by said controlled means, means for compelling the progressive operation of said operating means, and means for stopping said operating means at the end of its operating cycle, substantially as specified.

218. In an instrument of precision, means sensitive to forces acting thereon, means for indicating said forces; means independent of said sensitive means for operating said indicating means; means operatively connected to said indicating means and extending towards said sensitive means a distance relative to the extent of the indicating movement of said indicating means, means controlled by said sensitive means, and intermediate said sensitive means and said extending means, for determining the extent of said operation of said indicating means, means for locking said indicating means, means for actuating said locking means at points determined by said controlled means, means for compelling the progressive operation of said operating means, means for stopping said operating means at the end of its operating cycle, and means for releasing said stopping means at the beginning of the operating cycle of said operating means, substantially as specified.

219. In an instrument of precision, means sensitive to forces acting thereon, means for indicating said forces; means independent of

said sensitive means for operating said indicating means; means operatively connected to said indicating means and extending towards said sensitive means a distance relative to the extent of the indicating movement of said indicating means; means controlled by said sensitive means, and intermediate said sensitive means and said extending means, for determining the extent of said operation of said indicating means, trigger means on said extending means; means controlled by said sensitive means for operating said trigger means and determining the extent of said operation of said indicating means, means whereby said controlled means does not impair the action of said sensitive means, means for compelling the progressive operation of said operating means, means for locking said indicating means, and means for actuating said locking means at points determined by said controlled means, substantially as specified.

220. In an instrument of precision, means sensitive to forces acting thereon, means for indicating said forces; means independent of said sensitive means for operating said indicating means; means operatively connected to said indicating means and extending towards said sensitive means a distance relative to the extent of the indicating movement of said indicating means; means controlled by said sensitive means, and intermediate said sensitive means and said extending means, for determining the extent of said operation of said indicating means, trigger means on said extending means; means controlled by said sensitive means for operating said trigger means and determining the extent of said operation of said indicating means, means whereby said controlled means does not impair the action of said sensitive means, means for compelling the progressive operation of said operating means, means for locking said indicating means, means for actuating said locking means at points determined by said controlled means, and means for locking said operating means, substantially as specified.

221. In an instrument of precision, means sensitive to forces acting thereon, means for indicating said forces; means independent of said sensitive means for operating said indicating means; means operatively connected to said indicating means and extending towards said sensitive means a distance relative to the extent of the indicating movement of said indicating means; means controlled by said sensitive means, and intermediate said sensitive means and said extending means, for determining the extent of said operation of said indicating means, trigger means on said extending means; means controlled by said sensitive means for operating said trigger means and determining the extent of said operation of said indicating means, means whereby said controlled means does not im-

pair the action of said sensitive means, means for compelling the progressive operation of said operating means, means for locking said indicating means, means for actuating said locking means at points determined by said controlled means, and means for stopping said operating means at the end of its operating cycle, substantially as specified.

222. In an instrument of precision, means sensitive to forces acting thereon, means for indicating said forces; means independent of said sensitive means for operating said indicating means; means operatively connected to said indicating means and extending towards said sensitive means a distance relative to the extent of the indicating movement of said indicating means; means controlled by said sensitive means, and intermediate said sensitive means and said extending means, for determining the extent of said operation of said indicating means, trigger means on said extending means; means controlled by said sensitive means for operating said trigger means and determining the extent of said operation of said indicating means, means whereby said controlled means does not impair the action of said sensitive means, means for compelling the progressive operation of said operation means, means for stopping said operating means at the end of its operating cycle, and means for releasing said stopping means at the beginning of the operating cycle of said operating means, substantially as specified.

223. In an instrument of precision, means sensitive to forces acting thereon, means for indicating said forces; means independent of said sensitive means for operating said indicating means; means operatively connected to said indicating means and extending towards said sensitive means a distance relative to the extent of the indicating movement of said indicating means; means controlled by said sensitive means, and intermediate said sensitive means and said extending means, for determining the extent of said operation of said indicating means, means for locking said indicating means, means for actuating said locking means at points determined by said controlled means, and means whereby said controlled means does not impair the action of said sensitive means, substantially as specified.

224. In an instrument of precision, means sensitive to forces acting thereon, a cam movable proportionate thereto, means for indicating said forces, means independent of said sensitive means and cam for operating said indicating means, means operatively connected to said indicating means and extending towards said cam a distance relative to the extent of the indicating movement of said indicating means; and means controlled by said cam, and intermediate said cam and said extending means, for determining the extent of

said operation of said indicating means, substantially as specified.

225. In an instrument of precision, means sensitive to forces acting thereon, a cam movable proportionate thereto, means for indicating said forces, means independent of said sensitive means and cam for operating said indicating means, means operatively connected to said indicating means and extending towards said cam a distance relative to the extent of the indicating movement of said indicating means; means controlled by said cam, and intermediate said cam and said extending means, for determining the extent of said operation of said indicating means, and means for compelling the progressive operation of said operating means, substantially as specified.

226. In an instrument of precision, means sensitive to forces acting thereon, a cam movable proportionate thereto, means for indicating said forces, means independent of said sensitive means and cam for operating said indicating means, means operatively connected to said indicating means and extending towards said cam a distance relative to the extent of the indicating movement of said indicating means; means controlled by said cam, and intermediate said cam and said extending means, for determining the extent of said operation of said indicating means, means for compelling the progressive operation of said operating means, and means for stopping said operating means at the end of its operating cycle, substantially as specified.

227. In an instrument of precision, means sensitive to forces acting thereon, a cam movable proportionate thereto, means for indicating said forces, means independent of said sensitive means and cam for operating said indicating means, means operatively connected to said indicating means and extending towards said cam a distance relative to the extent of the indicating movement of said indicating means; means controlled by said cam, and intermediate said cam and said extending means, for determining the extent of said operation of said indicating means, means for compelling the progressive operation of said operating means, means for stopping said operating means at the end of its operating cycle, and means for releasing said stopping means at the beginning of the operating cycle of said operating means; substantially as specified.

228. In an instrument of precision, means sensitive to forces acting thereon, a cam movable proportionate thereto, means for indicating said forces, means independent of said sensitive means and cam for operating said indicating means, means operatively connected to said indicating means and extending towards said cam a distance relative to the extent of the indicating movement of said indicating means; means controlled by said

cam, and intermediate said cam and said extending means, for determining the extent of said operation of said indicating means, means whereby said controlled means does not impair the action of said sensitive means, means for compelling the progressive operation of said operating means, and means for stopping said operating means at the end of its operating cycle, substantially as specified.

229. In an instrument of precision, means sensitive to forces acting thereon, a cam movable proportionate thereto, means for indicating said forces, means independent of said sensitive means and cam for operating said indicating means, means operatively connected to said indicating means and extending towards said cam a distance relative to the extent of the indicating movement of said indicating means; trigger means on said extending means, and means whereby the co-operation of said cam and trigger means determines the extent of said operation of said indicating means, substantially as specified.

230. In an instrument of precision, means sensitive to forces acting thereon, a cam movable proportionate thereto, means for indicating said forces, means independent of said sensitive means and cam for operating said indicating means, means operatively connected to said indicating means and extending towards said cam a distance relative to the extent of the indicating movement of said indicating means; trigger means on said extending means, means whereby the co-operation of said cam and trigger means determines the extent of said operation of said indicating means, means for locking said indicating means, and means for actuating said locking means at the times determined by said co-operating means, substantially as specified.

231. In an instrument of precision, means sensitive to forces acting thereon, a cam movable proportionate thereto, means for indicating said forces, means independent of said sensitive means and cam for operating said indicating means, means operatively connected to said indicating means and extending towards said cam a distance relative to the extent of the indicating movement of said indicating means; trigger means on said extending means, means whereby the co-operation of said cam and trigger means determines the extent of said operation of said indicating means, means for locking said indicating means, means for actuating said locking means at the times determined by said co-operating means, and means whereby the co-operation of said cam and trigger means does not impair the action of said sensitive means, substantially as specified.

232. In an instrument of precision, means sensitive to forces acting thereon, a cam movable proportionate thereto, means for indicat-

ing said forces, means independent of said sensitive means and cam for operating said indicating means, means operatively connected to said indicating means and extending towards said cam a distance relative to the extent of the indicating movement of said indicating means; trigger means on said extending means, means whereby the co-operation of said cam and trigger means determines the extent of said operation of said indicating means, means for locking said indicating means, means for actuating said locking means at the times determined by said co-operating means, means whereby the co-operation of said cam and trigger means does not impair the action of said sensitive means, and means for compelling the progressive operation of said operating means, substantially as specified.

233. In an instrument of precision, means sensitive to forces acting thereon, a cam movable proportionate thereto, means for indicating said forces, means independent of said sensitive means and cam for operating said indicating means, means operatively connected to said indicating means and extending towards said cam a distance relative to the extent of the indicating movement of said indicating means; trigger means on said extending means, means whereby the co-operation of said cam and trigger means determines the extent of said operation of said indicating means, means for locking said indicating means, means for actuating said locking means at the times determined by said co-operating means, means whereby the co-operation of said cam and trigger means does not impair the action of said sensitive means, means for compelling the progressive operation of said operating means, and means for stopping said operating means at the end of its operating cycle, substantially as specified.

234. In an instrument of precision, means sensitive to forces acting thereon, a cam movable proportionate thereto, means for indicating said forces, means independent of said sensitive means and cam for operating said indicating means, means operatively connected to said indicating means and extending towards said cam a distance relative to the extent of the indicating movement of said indicating means; trigger means on said extending means, means whereby the co-operation of said cam and trigger means determines the extent of said operation of said indicating means, means for locking said indicating means, means for actuating said locking means at the times determined by said co-operating means, means whereby the co-operation of said cam and trigger means does not impair the action of said sensitive means, means for compelling the progressive operation of said operating means, means for stopping said operating means at the end of

its operating cycle, and means for releasing said stopping means at the beginning of the operating cycle of said operating means, substantially as specified.

235. In an instrument of precision, means constantly sensitive to forces acting thereon, indicating means; operating means, independent of said sensitive means, for operating said indicating means; and mechanical means operated by said operating means and controlled by said sensitive means whereby said sensitive means controls the extent of operation of said indicating means by said operating means without impairing the freedom of action of said sensitive means, substantially as specified.

236. In an instrument of precision, means sensitive to forces acting thereon, indicating means; operating means, independent of said sensitive means, for operating said indicating means; mechanical means whereby said sensitive means controls the extent of operation of said indicating means by said operating means without impairing the freedom of action of said sensitive means, and means for compelling the progressive operation of said operating means, substantially as specified.

237. In an instrument of precision, means sensitive to forces acting thereon, indicating means; operating means, independent of said sensitive means, for operating said indicating means; mechanical means whereby said sensitive means controls the extent of operation of said indicating means by said operating means without impairing the freedom of action of said sensitive means, means for compelling the progressive operation of said operating means, and means whereby said operating means is afforded a definite movement at each operation, substantially as specified.

238. In an instrument of precision, means sensitive to forces acting thereon, indicating means therefor; operating means, independent of said sensitive means, for operating said indicating means; means for locking said indicating means; and mechanical means whereby said sensitive means controls, the extent of operation of said indicating means, and the time of actuation of said locking means, by said operating means, without impairing the freedom of action of said sensitive means; substantially as specified.

239. In an instrument of precision, means sensitive to force acting thereon, means independent of said sensitive means and adapted to be moved proportionate to said force acting on said sensitive means, means independent of said sensitive means for operating said second named means, and means operated independent of and controlled by said sensitive means whereby said sensitive means determines the extent of movement of said second named means by said operating means without impairing the sensitiveness

of said sensitive means, substantially as specified.

240. In an instrument of precision, means sensitive to forces acting thereon, indicating means; separate mechanical means operated, independent of, and controlled by, said sensitive means for actuating said indicating means to indicate said forces without affecting the action of said sensitive means, and means for limiting each operation of said last named means to a definite cycle and stopping the same at a fixed point, substantially as specified.

241. In an instrument of precision, control means, a plurality of indicating means, operating means for said indicating means, means whereby said control means determines the extent of said operation of part of said indicating means, and independent means for controlling the extent of said operation of said indicating means not controlled by said fourth named means, substantially as specified.

242. In an instrument of precision, a sensitive means, means bearing type, a platen, operating means independent of said sensitive means for relatively moving said means bearing type and said platen and operating said means bearing type, means controlled by said sensitive means for determining the printing position of said means bearing type, means controlled by said sensitive means for arresting further operation of said means bearing type by said operating means when said determined printing position has been attained, and means whereby said means bearing type may be returned to normal position by said driving means, substantially as specified.

243. In an instrument of precision, sensitive means, means bearing type, a platen, means independent of said sensitive means for operating said means bearing type and relatively moving said platen and said means bearing type; and means, including a second sensitive means co-operating with and operatively independent of said first sensitive means, for determining the printing position of said means bearing type, substantially as specified.

244. In an instrument of precision, sensitive means, means bearing type, a platen, means independent of said sensitive means for operating said means bearing type and relatively moving said platen and said means bearing type; and means operable by said operating means, including a second sensitive means co-operating with said first sensitive means, for determining the printing position of said means bearing type, substantially as specified.

245. In an instrument of precision, a control means, a plurality of means bearing type, platen, means for operating each of said means bearing type and relatively

moving said platen and said means bearing type, means controlled by said control means for arresting the movement of part of said means bearing type, and means controlled by said arrested means bearing type for arresting the unarrested means bearing type, substantially as specified.

246. Two means bearing type, a platen, means for successively operating said means bearing type, means for arresting the movement of the first operated means bearing type at any of a plurality of points, means for arresting the movement of the second operated means bearing type at a point determined by the arrested position of said first operated means bearing type, and means for aligning the type on said means, substantially as specified.

247. In an instrument of precision, means sensitive to forces acting thereon, means bearing printing characters representing said forces, a platen, means independent of said sensitive means for operating said means bearing type and relatively moving said platen and said means bearing type, and means whereby instantaneous co-operation of said sensitive means and a part of said operating means determines the extent of operation of said means bearing type by said operating means, substantially as specified.

248. In an instrument of precision, means sensitive to forces acting thereon, means bearing type in sequences, a platen, means for relatively moving said means bearing type and said platen and for moving some of said means bearing type in different directions relative to their respective type sequences to attain the printing point controlled by said sensitive means, substantially as specified.

249. In an instrument of precision, means sensitive to forces acting thereon, means bearing type in sequences, means independent of said sensitive means for operating some of said means bearing type in different directions relative to their respective type sequences, and means controlled by said sensitive means for determining the printing point of said means bearing type without impairing the free action of said sensitive means, substantially as specified.

250. In an instrument of precision, sensitive means, a plurality of means bearing type in sequences, a platen, means independent of said sensitive means for operating some of said means bearing type in different directions relative to their respective type sequences and at different times, and means controlled by said sensitive means for determining the extent of said operation of said means bearing type, substantially as specified.

In witness whereof, I have hereunto affixed my signature.

HUGO COOK.