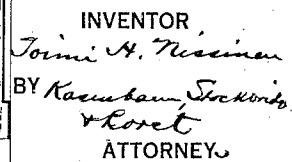


1,362,261.

5 SHEETS—SHEET 1.



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T. A. NISSINEN.
ENGRAVING MACHINE.
APPLICATION FILED MAR. 21, 1919.

Patented Dec. 14, 1920.

5 SHEETS—SHEET 2.

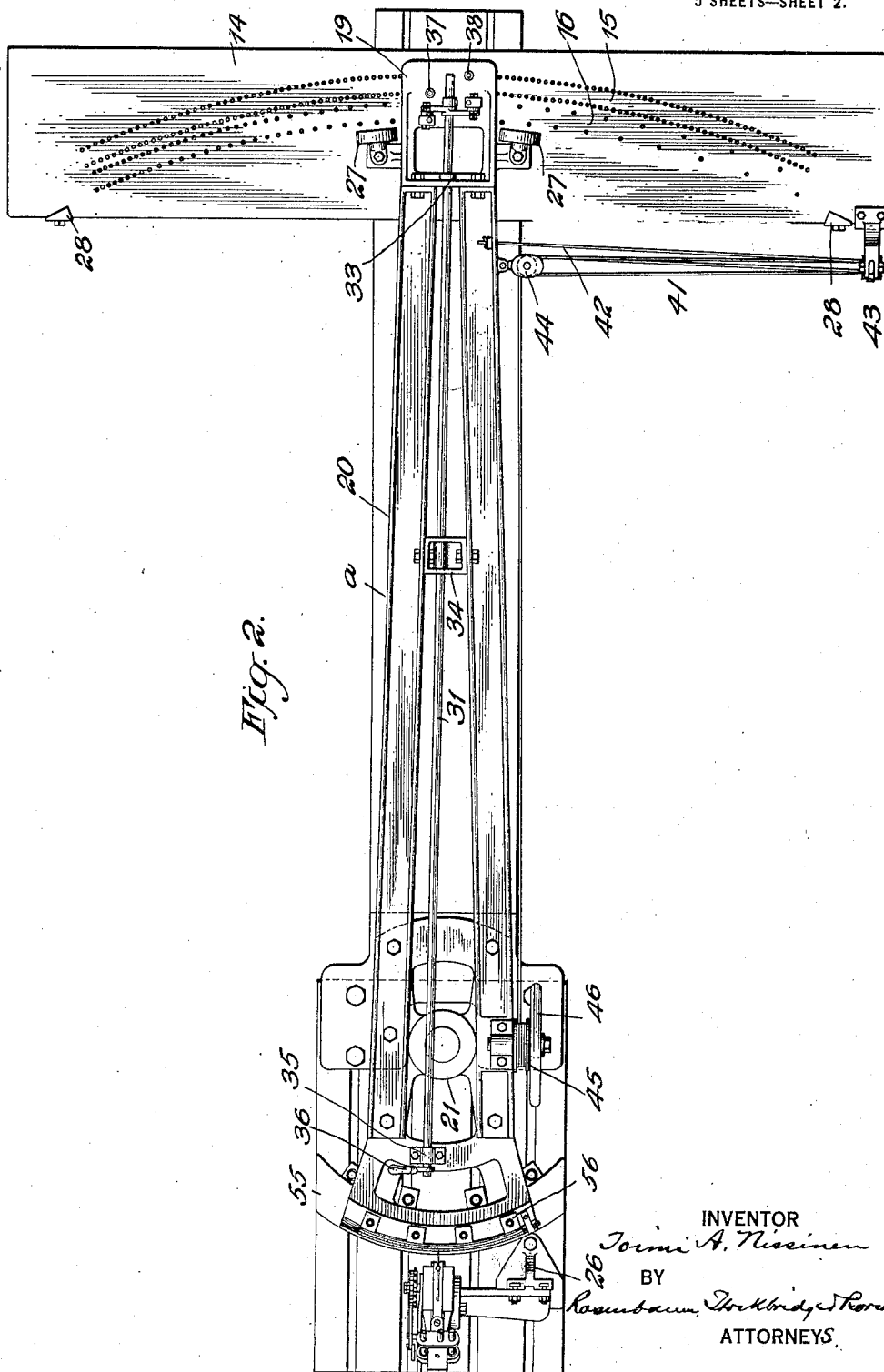


Fig. 2.

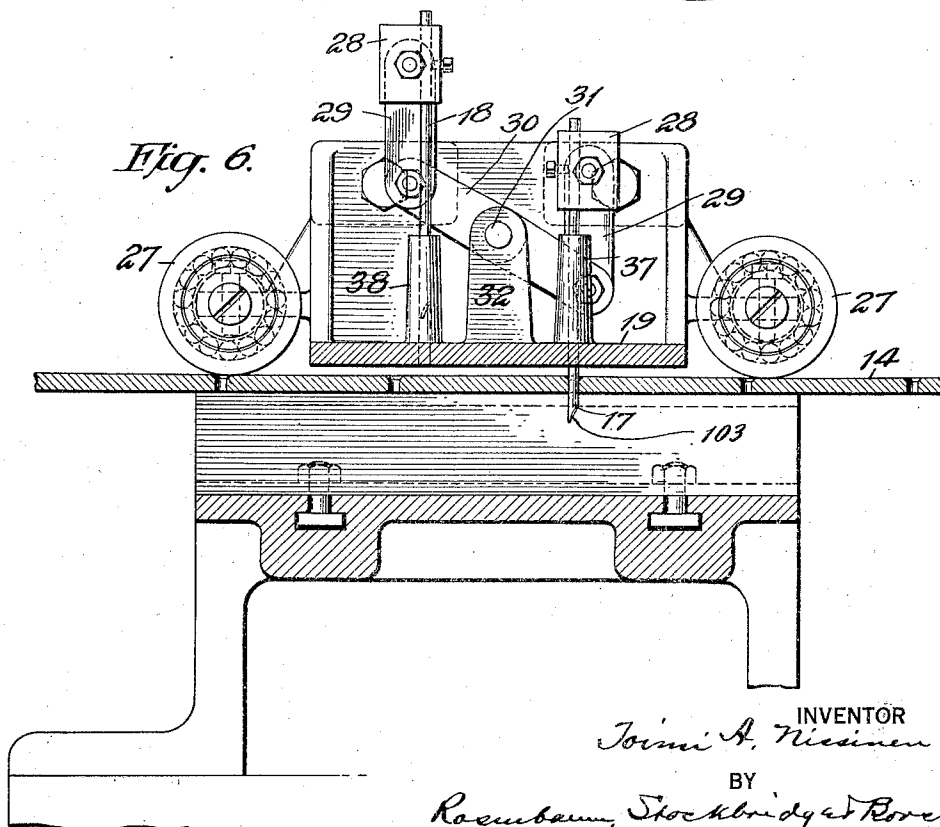
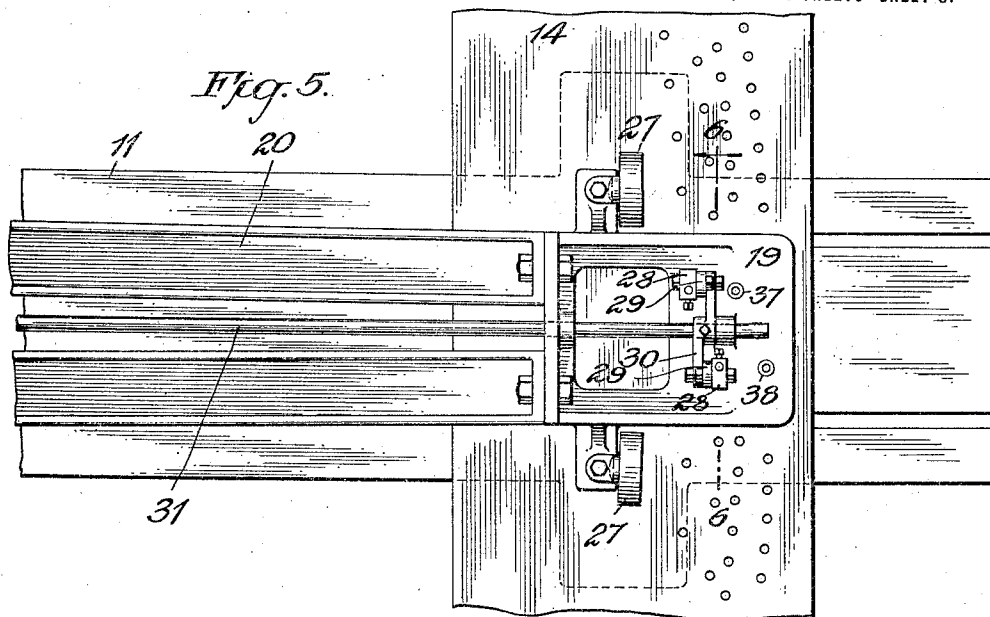
INVENTOR
Toimi A. Nissinen
BY
Rosendorn, Stockbridge & Peters
ATTORNEYS.

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Patented Dec. 14, 1920.

5 SHEETS—SHEET 3.



INVENTOR
Joimi A. Nissinen

BY
Rosubau, Stockbridge & Roret
ATTORNEYS

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5 SHEETS—SHEET 4.

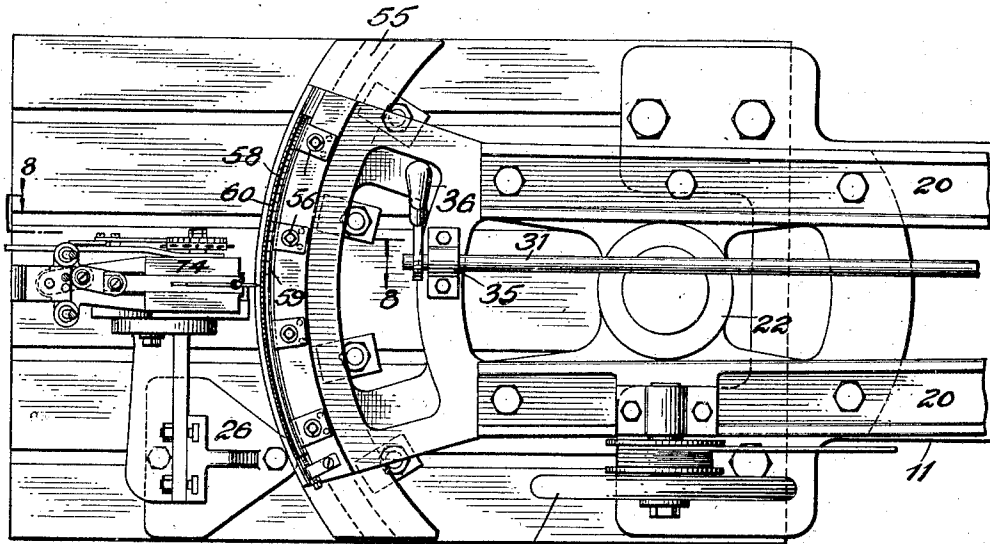


Fig. 7

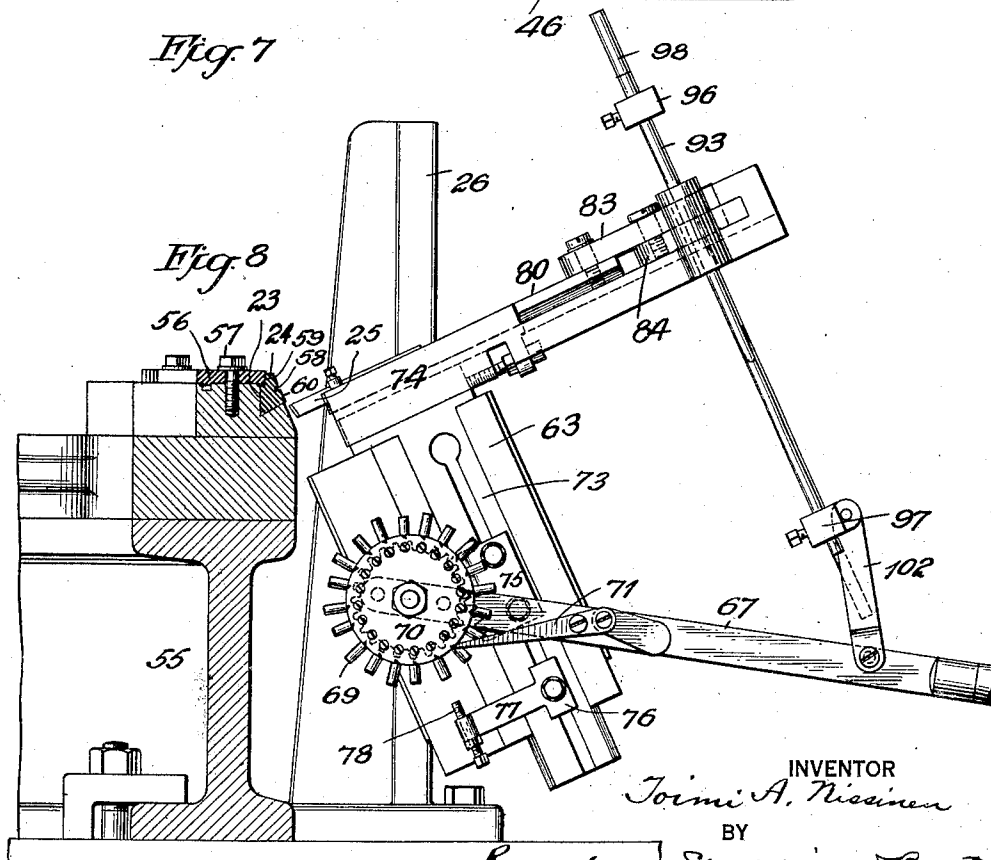


Fig. 8

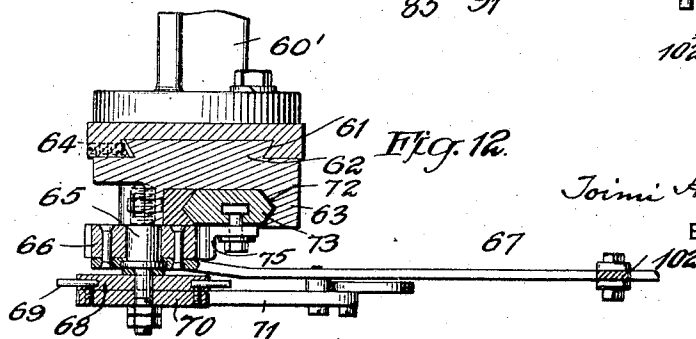
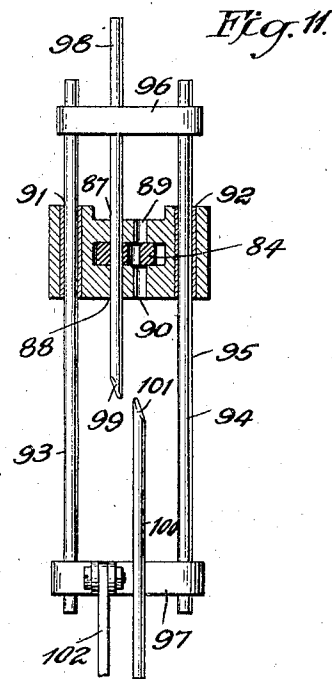
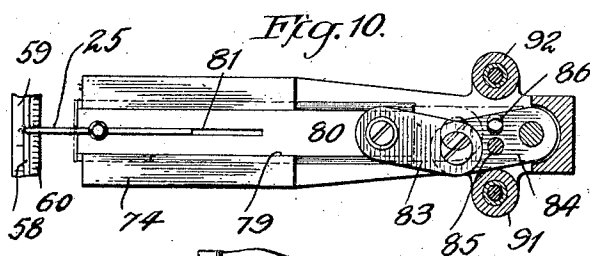
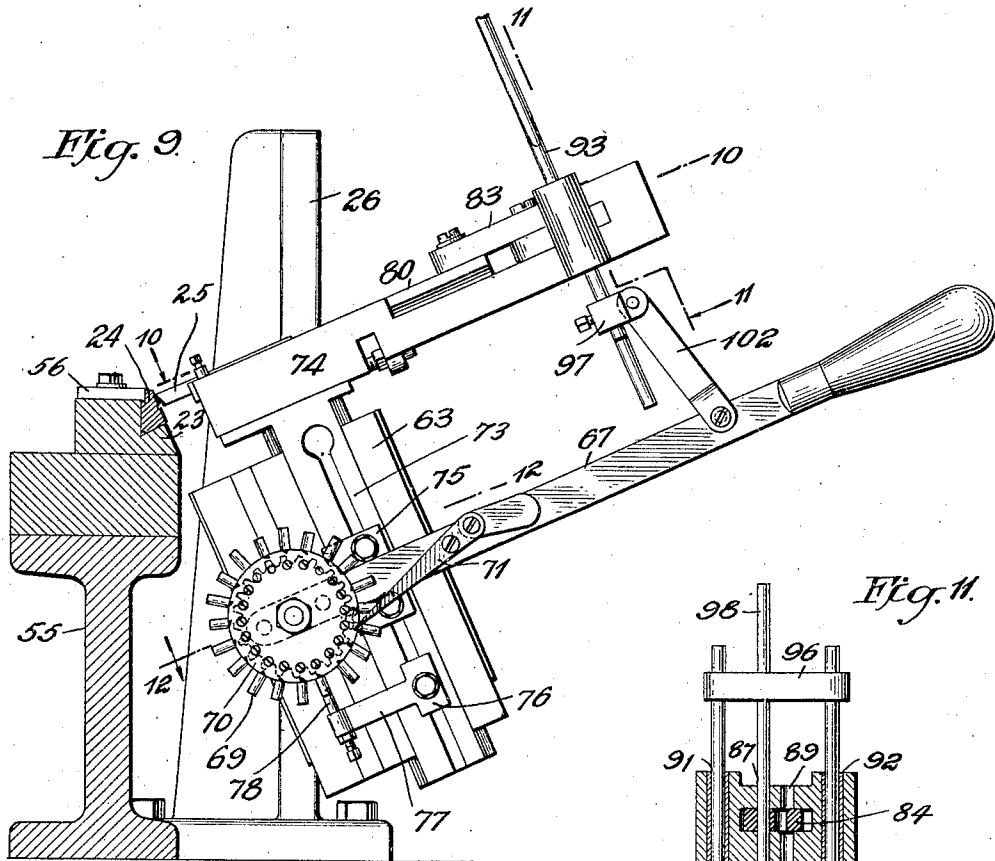
INVENTOR
Toimi A. Nissinen
BY
Raschbaum, Stockbridge & Roret.
ATTORNEYS

1,362,261.

T. A. NISSINEN.
ENGRAVING MACHINE.
APPLICATION FILED MAR. 21, 1919.

Patented Dec. 14, 1920.

5 SHEETS—SHEET 5.



INVENTOR
Toimi A. Nissinen
BY Rosinbaum, Starkbridge
& Roset
ATTORNEYS.

UNITED STATES PATENT OFFICE.

TOIMI A. NISSINEN, OF YONKERS, NEW YORK.

ENGRAVING-MACHINE.

1,362,261.

Specification of Letters Patent.

Patented Dec. 14, 1920.

Application filed March 21, 1919. Serial No. 284,046.

To all whom it may concern:

Be it known that I, TOIMI A. NISSINEN, a citizen of Finland, residing at Yonkers, in the county of Westchester and State of New York, have invented certain new and useful Improvements in Engraving-Machines, of which the following is a full, clear, and exact description.

This invention relates to engraving machines and more particularly to those machines which are used for engraving graduations on gun sights, scales and the like.

One object of the invention is to provide in a machine of this kind, means for setting or adjusting the work for different engraving positions so arranged with respect to the work that any inaccuracies in the setting or adjustments will appear only in diminished amount in the work itself.

Another object is to provide simple and efficient means for imparting to the tool, in addition to its engraving movement, a movement into and out of engagement with the work at the proper time, and means for automatically and variably limiting the extent of the engraving movement according to a predetermined plan.

Other objects of the invention will hereinafter appear, and the novel features thereof will be set forth in the claims.

In the drawings:

Figure 1 is a side elevation of a machine made according to the present invention;

Fig. 2 is a plan of the same;

Fig. 3 is a fragmentary section on the line 3—3 of Fig. 1;

Fig. 4 is a section on the line 4—4 of Fig. 3.

Fig. 5 is a fragmentary enlarged plan showing the position defining indications and the long arm of the work carrier in registration therewith.

Fig. 6 is a section on the line 6—6 of Fig. 5.

Fig. 7 is a fragmentary enlarged plan showing the work engaged by the engraving tool.

Figs. 8 and 9 are fragmentary views, partly in section, showing successive positions of the tool actuating arm and appurtenant parts.

Fig. 10 is a section on the line 10—10 of Fig. 9.

Fig. 11 is a section on the line 11—11 of Fig. 9.

Fig. 12 is a section on the line 12—12 of Fig. 9.

In carrying out the invention, I provide an eccentrically pivoted carrier, on the short arm of which the work is supported, and means acting on the long arm of the carrier for moving it and the work carried thereby to different engraving positions, and for holding the same in such positions during the engraving operation.

In the embodiment illustrated there is provided a table 11 properly supported by the standards 12 and 13. At the front of the table 11 there is provided the laterally extending platform 14, having two pairs of arcuate rows of orifices 15 and 16, for co-operating with the pins 17 and 18 mounted in the head 19 at the end of the long arm 20 of the work carrier *a*, which is pivotally mounted in the bearing 21 with its short arm 22 provided with a seat 23 for receiving the work 24 to be operated upon, whereby the successive operating positions of the work carrier are accurately determined.

The engraving tool 25 is mounted to reciprocate relative to the standard 26 which is fixed to the rear portion of the table 11 rearwardly of the path of movement of the work receiving end of the work carrier *a*.

For facilitating the oscillation of the long arm 20, the rollers 27 are provided, the axes of which coincide with the lines radiating from the axial center of said arm 20. At the far ends of the platform 14 are formed stops 28 which coöperate with the rollers 27 to limit the movement of the arm 20.

The pins 17 and 18 are secured by suitable bearing blocks 28—28 to the upwardly extending arms 29, 29 pivotally connected to the lever 30, which is adjustably mounted on the shaft 31. The shaft 31 is carried at its front end in the bearing 32 formed on the arm 20, additionally supported by the intermediate bearings 33, 34, and supported at its rear end in the bearing 35, to the rear of which the operating handle 36 is fixedly located on said shaft 31. To alternately register with the orifices 15 there are provided the pin guiding thimbles or thimble guides 37, 38, and to alternately register with the orifices 16, there are provided like thimble guides 39, 40 formed on the arm 20. The manipulation of the pins is substantially as follows: Assume that the lever 30, as shown, is set so that the pins 17 and 18

reciprocate in the guides 39, 40, then upon the guide 39 or 40 registering with an orifice 16, the proper manipulation by the handle 36 will swing either the pin 17 or 18 into an orifice 16. Since the spaces between the orifices 16 vary from very short spaces at the top of Fig. 2 to comparatively long spaces at the bottom of said figure, it has been found desirable to actuate the arm 20 from one to another of such orifices 16 by means of the block and tackle arrangement 41, in which a cable 42 is fixed at one end to the arm 20, is wound around the sheaves 43 and 44 connected to the platform 14 and arm 20, respectively, and then to the sheave 45 formed on the side of the wheel 46. When the lever 30 is mounted on the shaft 31 so that its pins 17 and 18 register with the guides 37 and 38, then the orifices 15 will be engaged. Since the orifices 15 are disposed relatively close to one another and the spaces between them uniform, it has been found desirable to so arrange the oscillation of the shaft 31 that successive orifices can be engaged alternately by the pins 17 and 18 by merely swinging the lever 36 from side to side as the need arises. The pins 17 and 18 are provided with the cam faces 103 along their ends, which cooperate with the orifices to advance the work carrier *a*. When the pins cooperate with the orifices 15 then the cam faces 103 will be solely depended upon for advancing the carrier. When the pins cooperate with the orifices 16, then these cam faces serve to facilitate the ready engagement of the orifices by said pins.

The bearing 21 on which the carrier *a* is mounted is adapted to facilitate accurate alinement of such carrier relative to its appurtenant parts, and since it forms no part of the present invention the following brief description will suffice. This bearing comprises an enlarged cylindrical boss, having a shank 47 extending down from the center thereof, around which shank 47 in said boss 46 there is formed an annular groove 48 to space the annular bearing face 49 of the boss from said shank 47. On the table 11 there is secured a bearing 50 which incloses a split bushing 51 drawn tightly against the shank 47. To the lower face of the table 11 there is secured a bearing bracket 52 which incloses a split bushing 53 similar to the bushing 51 which is also tightly drawn against the shank 47. The lower end of the shank 47 is threaded and has lock nuts 54 secured thereto to lock the shank in place. The work occupying end of the short arm 22 is mounted to travel on the smooth faced bearing 55 and has an arcuate rear face in which the sharp V-shaped seat 23 is formed to receive the work 24 which conforms thereto. To anchor the work in the seat 23 the locking plates 56 are provided, which engage the rear

upper edge of the work 24 and upper face of the work supporting arm 88, and are secured in place by the screws 57.

The work 24 illustrating a range scale, and for engraving which the machine is especially adapted, embraces an arcuate metal strip having a medial groove 58 extending throughout the same, the upper zone 59 of which, see Fig. 7, is cut with graduations, the distances between which vary from the shortest at the lower end of Fig. 7 to the widest at the upper end of such figure, and the lower zone 60 of which is cut with graduations that are uniformly spaced from one another. The varying graduations are designated "meter" graduations and the uniform graduations are designated "mill" graduations by the range finder and are generally marked "Mtr." and "Mil.", respectively. Since the invention confines itself to means for engraving the graduations, the use of these scales will not be gone into.

The engraving tool and its appurtenant parts which form an important part of the present invention will now be described. Rearwardly of the short arm 22 and on the table 11 there is formed the standard 26, from one side of which extends the arm 60', having formed in its end face the dove-tail groove 61 to receive the dove-tail 62 of the block 63, such block 63 being secured to the arm 60' in said dove-tail slot by the set screw 64. In the block 63 there is journaled the stub shaft 65 on which is rotatably mounted the gear 66, to which is fixed the operating lever 67. Also loosely mounted on said stub shaft 65 is a stop wheel 68, on the periphery of which, and radially extending therefrom, there are provided a plurality of stop pins 69 adjustably mounted to extend different distances from such periphery. Adjacent to said stop wheel 68 and fixed thereto is provided the notched disk 70 which is adapted to cooperate with the pawl 71 secured to the lever 67.

Adjacent to the stub shaft 65 there is formed an elongated slideway 72 in the block 63, in which is slidably mounted the slide block 73, on the upper end of which is mounted the tool supporting bracket 74, and along the sides of which are mounted the rack 75 and stop cooperating bracket 76. The rack 75 meshes with the gear 66 and thus when the handle 67 is rocked, the gear 66 will actuate the rack 75 to in turn actuate the bracket 74. The stop cooperating bracket 76 has an arm 77 provided with a stop face 78 for alining with and engaging one of the stop pins 69 of the stop wheel.

In the upper portion of the bracket 74 there is formed a slideway 79 to receive the slide piece 80 in the groove 81 on which the engraving tool 25 is adjustably mounted. The rear end of the slide piece 80 is pivotally connected to the link 83 which is pivot-

ally connected to the perforated link 84 which is pivoted to the rear end of the bracket 74. In the link 84 are provided two adjacent orifices or perforations 85 and 86.

5 The bracket 74, which extends both above and below the link 84, is provided with one set of alined openings 87 and 88 to register at one time with the orifice 85, and another set of alined openings 89 and 90, to register
10 at another time with the orifice 86. On the sides of the bracket 74 adjacent to the link 84 there are formed the ears 91 and 92, having parallel openings therein to receive the parallel rods 93 and 94 respectively, of
15 the frame 95. The rods 93 and 94 are connected at their upper ends to the cross piece 96 disposed above the bracket 74 and at their lower ends to the cross piece 97 below the bracket 74. Secured to and extending down-
20 wardly from the cross piece 96 there is provided the pin 98 which is adapted to register with the orifices 87, 85 and 88 and has a cammed end 99, the point of which is disposed along the face of such pin which lies
25 adjacent the orifices 89 and 90. Secured to and extending upwardly from the cross piece 97 there is provided a pin 100 which is adapted to register with the orifices 89, 86 and 90 and has a cammed end 101, the
30 point of which is disposed along the face of such pin which lies adjacent to the orifices 87 and 88. The cross piece 97 in addition is normally connected to the lever 67 by the link 102.

35 The operation of the engraving tool is substantially as follows: Assuming that the upper scale 59 is to be cut, the stops 69 would be adjusted according to the depth of the several cuts to be made thereupon, the
40 stop coöperating bracket 77 adjusted, and upon the upward movement of the lever 67,—the links 83 and 84 being so timed that when the tool passes beyond the lower zone 60, the pin 98 will be moving out of the
45 orifice 85 and the pin 100 entering the orifice 86,—the inclined face of the point 101 will serve to cam the link 84 over, and thereby thrust the link 83 forward to in turn move the tool 25 into engagement with
50 the zone 59. Upon the downward movement of the lever 67, the tool 25 will be withdrawn out of engraving engagement as soon as it reaches the groove 58, at which time the pin 100 will again release the link 84 and the pin
55 98 returned into engagement with such link 84.

When it is desired to engrave the lower zone 60, the frame 95 will be disconnected from the lever 67 and the stop pin 69 and
60 stop bracket 77 solely depended upon to limit the engraving action to the lower zone, to the exclusion of the upper zone.

It is obvious that various changes and modifications may be made to the details

of construction without departing from the 65 general spirit of the invention.

I claim:

1. The combination with a frame, of a work carrier pivotally mounted thereon, said carrier having a short arm on the end 70 of which the work to be operated upon is mounted and a long arm, and means associated with the said long arm for determining the relative positions of the carrier.

2. In an engraving machine, the combina- 75 tion of an eccentrically pivoted carrier, having provision for supporting work on a short arm thereof, means directly acting through the medium of the end of the long arm of the carrier for locating and holding 80 the carrier in different engraving positions, and engraving means in position to operate upon the work.

3. The combination with a frame, of a work carrier pivotally mounted thereon, 85 said carrier having a short arm on the end of which the work to be operated upon is mounted and a long arm, means for mounting a tool in position to operate on the work, means associated with said long arm for de- 90 termining the relative positions of the carrier, and means for anchoring said long arm at desired positions.

4. The combination with a frame, of a work carrier pivotally mounted thereon, 95 said carrier having a short arm on which the work to be operated upon is mounted and a long arm, a platform having a row of orifices therein defining on an enlarged scale the successive positions of the short arm, 100 means for mounting a tool in position to operate on the work carried by said carrier, and means on said long arm for coöperating with said orifices to anchor the work carrier in proper position relative to said 105 tool.

5. The combination with a frame, of a work carrier having two arms pivotally mounted thereon, one arm of which receives the work to be operated upon, the other arm 110 of which defines the position of said work carrier, means for mounting a tool in position to operate on the work thus carried, and means for anchoring said carrier in tool operating position. 115

6. The combination with a frame, of a work carrier having two arms pivotally mounted thereon, one arm of which receives the work to be operated upon, pins mount- 120 ed on the other arm, means for mounting a tool in position to operate on the work thus carried, and a platform having a row of orifices defining the positions of said work carrier and adapted to receive said pins to anchor said work carrier in tool operating 125 position.

7. The combination with a frame, of a work carrier having two arms pivotally

mounted thereon, one arm of which receives the work to be operated upon, a lever mounted on the other arm, a shaft mounted on said carrier and connected to operate said lever, means for mounting a tool in position to operate on the work thus carried, a platform having rows of orifices defining the positions of said work carrier, pins, one on each end of said lever for alternately engaging said orifices, and means for rocking said shaft, thereby to rock said lever to in turn operate said pins to engage successive orifices in alternate rows.

8. The combination with a frame, of a work carrier having two arms pivotally mounted thereon, one arm of which receives the work to be operated upon, a lever mounted on the other arm, a shaft mounted on said work carrier and connected to operate said lever, means for mounting a tool in position to operate on the work thus carried, a platform having rows of orifices defining the positions of said work carrier, pins, one on each end of said lever, means for rocking said shaft, thereby to rock said lever to in turn operate said pins to engage successive orifices in alternate rows, and cam faces on said pins for coöperating with said orifices to advance said work carrier.

9. The combination with a frame, of a work carrier having two arms pivotally mounted thereon, one arm of which receives the work to be operated upon, a lever mounted on the other arm, a shaft mounted on said work carrier and connected to operate said lever, means for mounting a tool in position to operate on the work thus carried, a platform having two concentric rows of orifices uniformly spaced from one another defining the positions of said work carrier, pins, one on each end of said lever for alternately engaging said orifices, means for rocking said shaft thereby to rock said lever to in turn operate said pins to engage successive orifices in alternate rows, and cam faces on said pins for coöperating with said orifices to advance said work carrier.

10. The combination with a frame, of a work carrier having two arms pivotally mounted thereon, one arm of which receives the work to be operated upon, a lever mounted on the other arm, a shaft mounted on said work carrier and connected to operate said lever, means for mounting a tool in position to operate on the work thus carried, a platform having rows of orifices defining the positions of said work carrier, pins, one on each end of said lever, means for rocking said shaft, thereby to rock said lever to in turn operate said pins to engage successive orifices in alternate rows, cam faces on said pins for coöperating with said orifices to advance said work carrier, a hand wheel, and means operatively connecting said hand wheel to said platform and carrier so that

the operation of said hand wheel will assist in advancing said carrier.

11. The combination with a frame, of a work carrier mounted thereon, said carrier having a short arm on which the work to be operated upon is mounted, and a long arm having pins mounted therein, a platform having a plurality of rows of orifices defining on an enlarged scale a plurality of groups of successive positions of the short arm, means for mounting the tool in position to operate on the work carried by said carrier, and means on said long arm for setting said pins to register either with one or another row of orifices to successively anchor the work carrier in proper position relative to said tool.

12. The combination with a frame, of a work carrier having two arms pivotally mounted thereon, one arm of which receives the work to be operated upon, a lever mounted on the other arm, a shaft mounted on said work carrier and connected to said lever, means for mounting a tool in position to operate on the work thus carried, a platform having a plurality of rows of orifices defining on an enlarged scale a plurality of groups of successive positions of the work carrying arm, pins, one on each end of said lever, a plurality of sets of cylindrical guides on said other arm, one set of guides to register with each group of orifices, said lever being adjustably mounted on said shaft to register with one or another of said sets of guides, and means for rocking said shaft thereby to rock said lever to in turn operate said pins to engage successive orifices in the alternate rows of a group of orifices.

13. The combination with a frame, of a work carrier having two arms pivotally mounted thereon, one arm of which receives the work to be operated upon, a lever mounted on the other arm, a shaft mounted on said work carrier and connected to said lever, means for mounting a tool in position to operate on the work thus carried, a platform having a plurality of rows of orifices defining on an enlarged scale a plurality of groups of successive positions of the work carrying arm, pins, one on each end of said lever, a plurality of sets of cylindrical guides on said other arm, one set of guides to register with each group of orifices, said lever being adjustably mounted on said shaft to register with one or another of said sets of guides, means for rocking said shaft thereby to rock said lever to in turn operate said pins to engage successive orifices in the alternate rows of a group of orifices, and cam faces on said pins for coöperating with said orifices to advance said work carrier.

14. The combination with a work carrier, of a support, a slide block slidably mounted in said support, a tool mounted on said slide

block, a gear rotatably mounted on said support, a rack secured to said slide block and in mesh with said gear, a handle fixed to said gear for operating the same thereby to advance said tool into coöperative relation with said work carrier, a wheel having a plurality of stops radially mounted thereon, and a stop coöperating bracket mounted on said slide block and coöperating with one of said stops to limit the movement of said slide block.

15. The combination with a work carrier, of a support, a slide block slidably mounted in said support, a tool mounted on said slide block, a gear rotatably mounted on said support, a rack secured to said slide block and in mesh with said gear, a handle fixed to said gear for operating the same thereby to advance said tool into coöperative relation with said work carrier, a wheel having a plurality of stops radially mounted thereon, a stop coöperating bracket mounted on said slide block and coöperating with one of said stops to limit the movement of said slide block, a notched wheel fixed on the side of said stop wheel, and a pawl connected to said handle and coöperatively associated with said notched wheel to advance said stop wheel step by step.

16. The combination with a carrier for work, of a support, a slide block slidably mounted in said support, a tool slidably mounted in said slide block, a lever, means for operatively connecting said lever to said slide block whereby reciprocable motion may be imparted thereto, and means connecting said lever to said tool whereby the tool may be advanced into and out of work-engaging position.

17. The combination with a work carrier, of a support, a slide block slidably mounted in said support, a tool slidably mounted in said slide block, links connecting said tool with said slide block, a frame, a lever, means for operatively connecting said lever to said slide block whereby reciprocable motion may be imparted thereto, and pins mounted in

said frame and coöperating with said links to advance said tool into and out of work-engaging position.

18. The combination with a work carrier, of a support, a sliding block slidably mounted in said support, an engraving tool slidably mounted in said slide block, a lever, means for operatively connecting said lever to said slide block whereby said slide block may be reciprocated, means actuated by the upward movement of said lever for placing and maintaining said tool in work-engaging position and by the downward movement of said lever for placing and maintaining the tool out of work-engaging position.

19. The combination with a work carrier, of a support, a slide block slidably mounted in said support, engraving tool slidably mounted in said slide block, a lever, links connecting said tool with said slide block, one of said links having orifices therein, a frame connected to said lever, pins in said frame operating to alternately engage one or another of said orifices, the engagement of one of said orifices operating to advance said tool into work-engaging position and the engagement of the other of said orifices operating to withdraw said tool out of work-engaging position.

20. The combination with a work carrier, of a support, a slide block slidably mounted in said support, engraving tool slidably mounted in said slide block, a lever, links connecting said tool with said slide block, one of said links having orifices therein, a frame connected to said lever, pins in said frame, cam faces on the ends of said pins operating to alternately engage one or another of said orifices, the engagement of one of said orifices operating to advance said tool into work-engaging position and the engagement of the other of said orifices operating to withdraw said tool from work-engaging position.

In witness whereof I subscribe my signature.

TOIMI A. NISSINEN.