

No. 878,046.

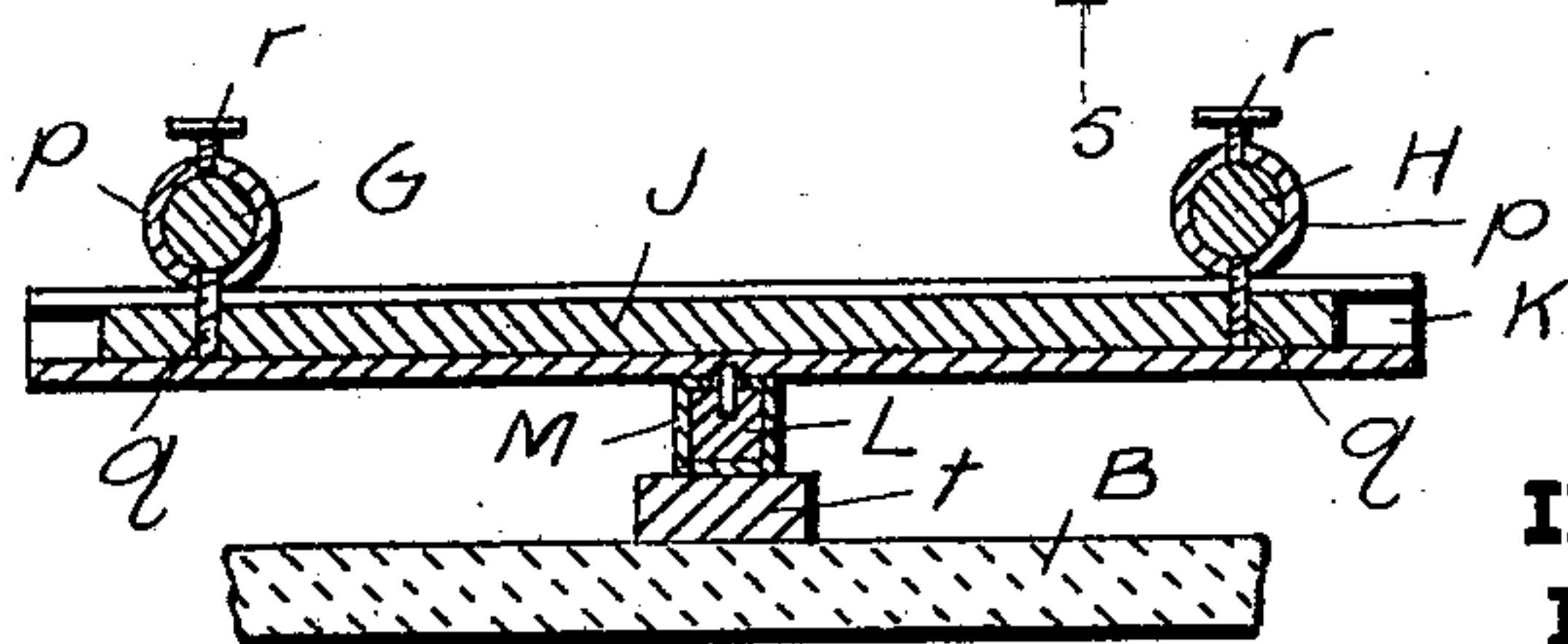
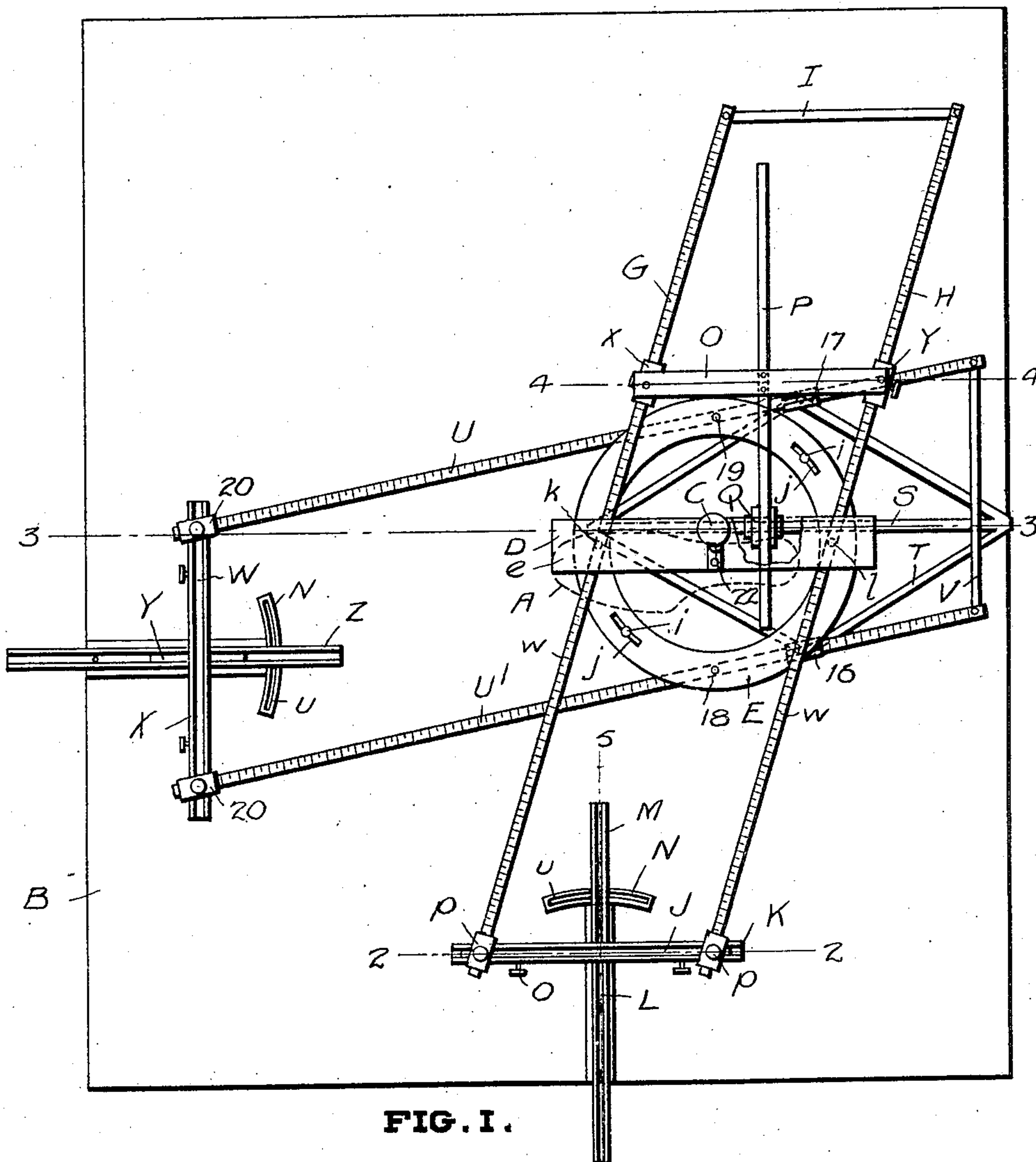
PATENTED FEB. 4, 1908.

L. E. CÔTÉ.

PATTERN GRADING MACHINE.

APPLICATION FILED MAY 23, 1906..

3 SHEETS—SHEET 1.



WITNESSES

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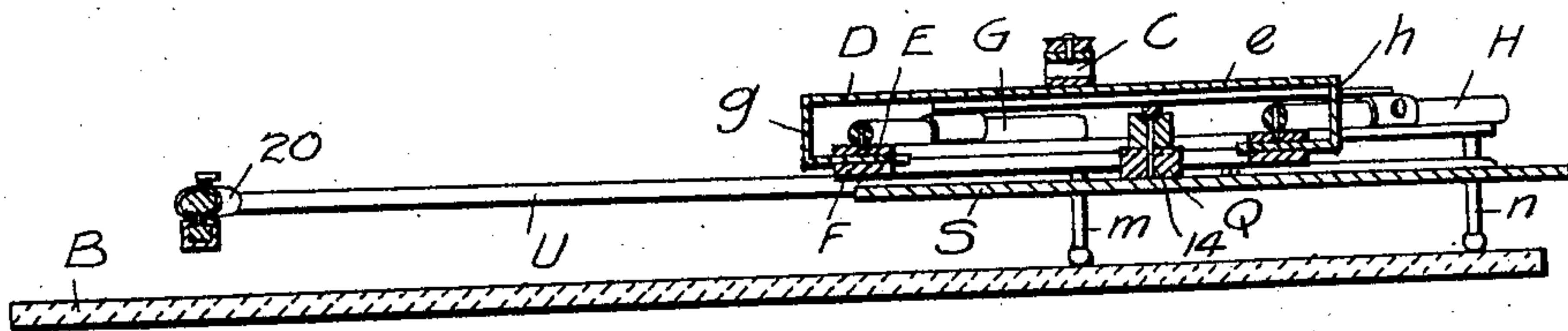


FIG. 3.

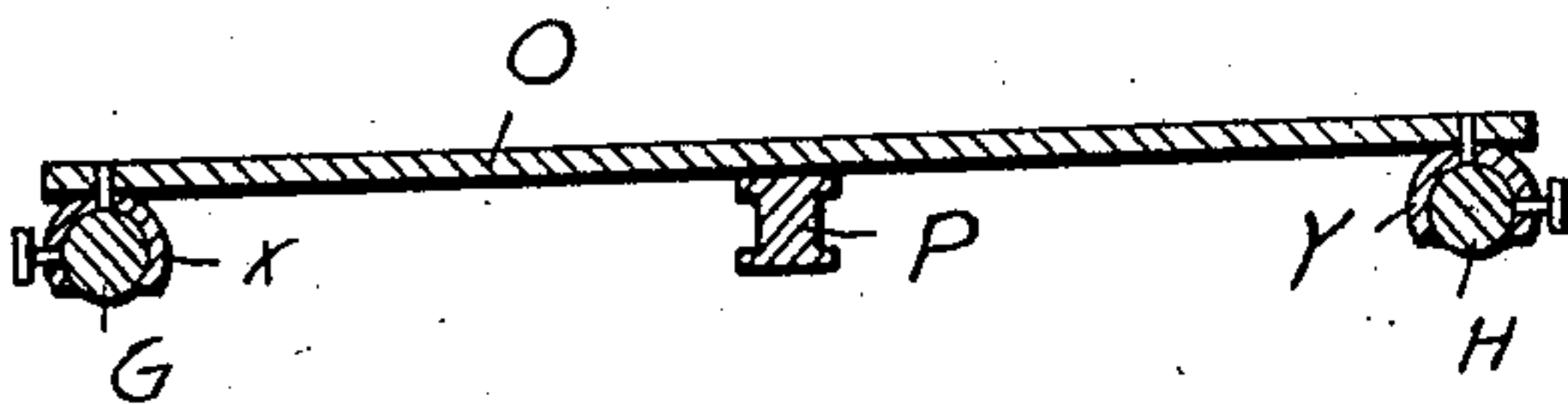


FIG. 4.

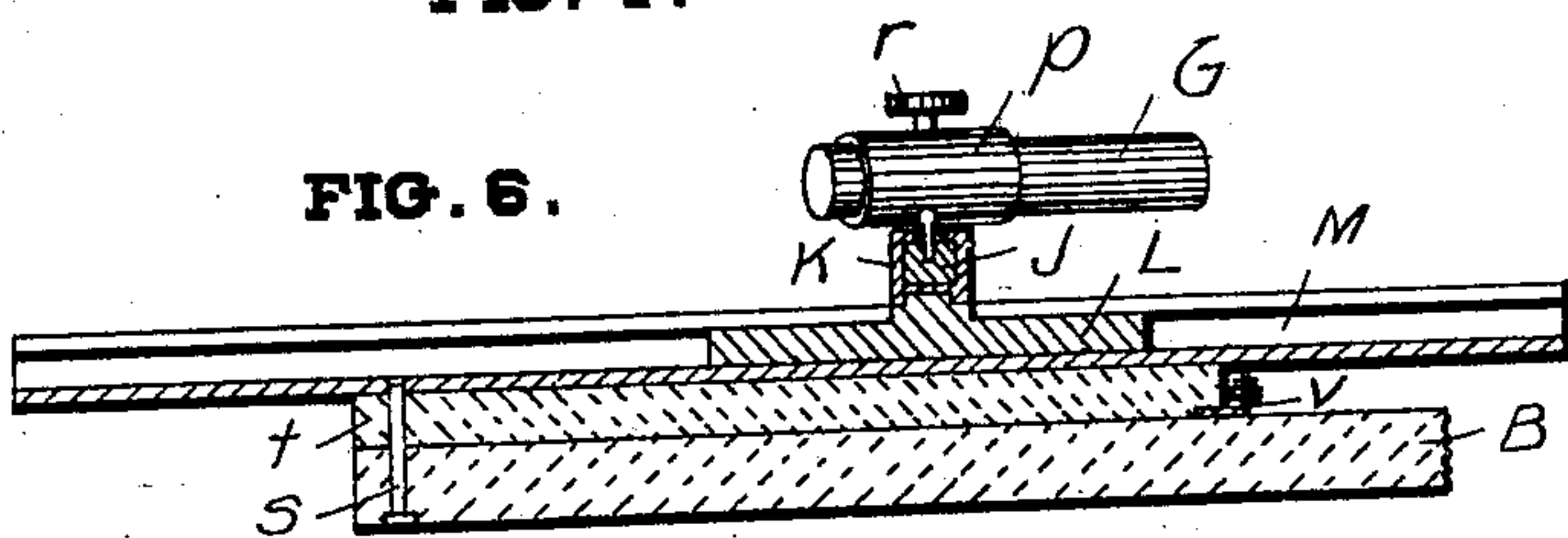


FIG. 6.

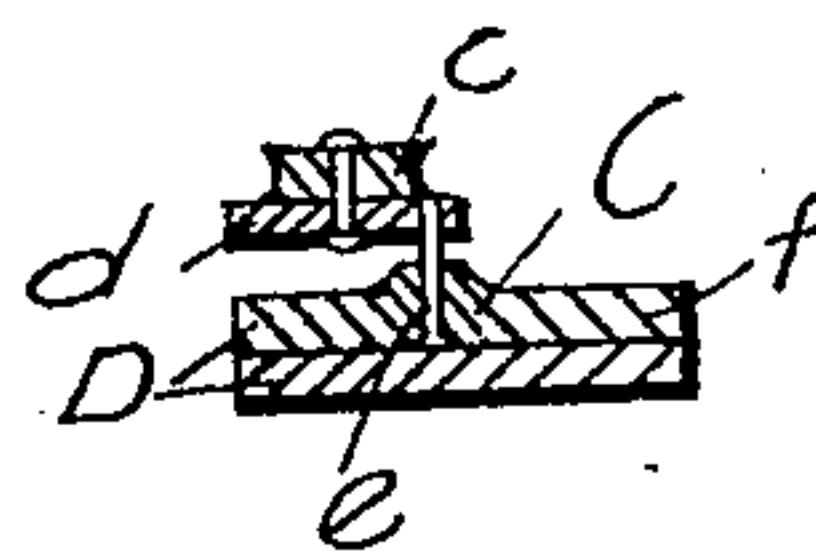


FIG. 5.

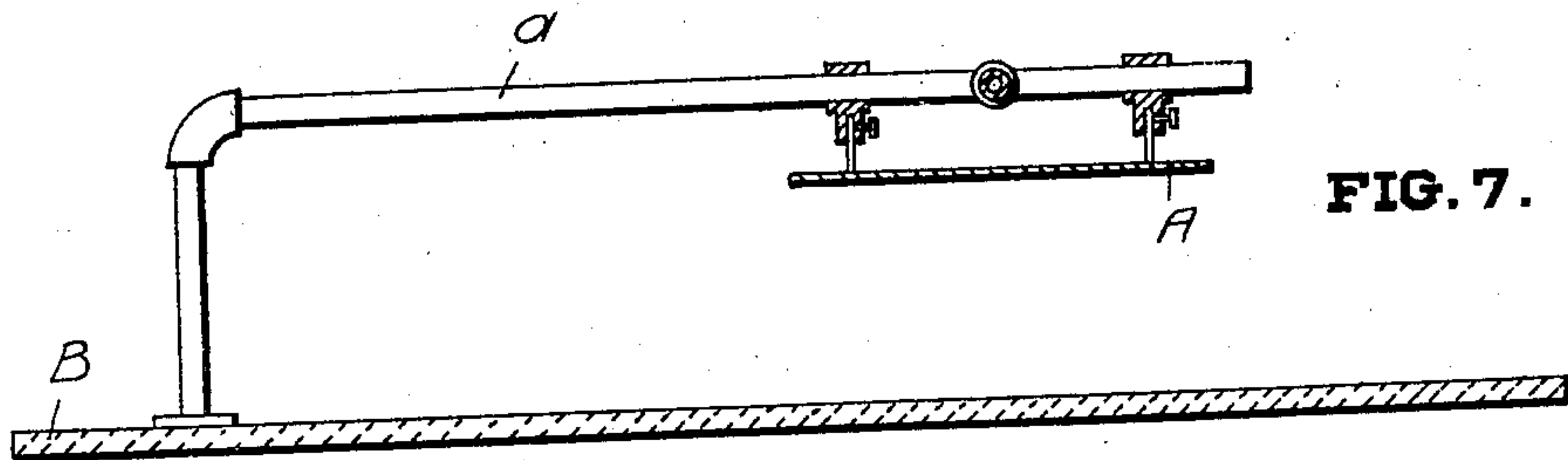
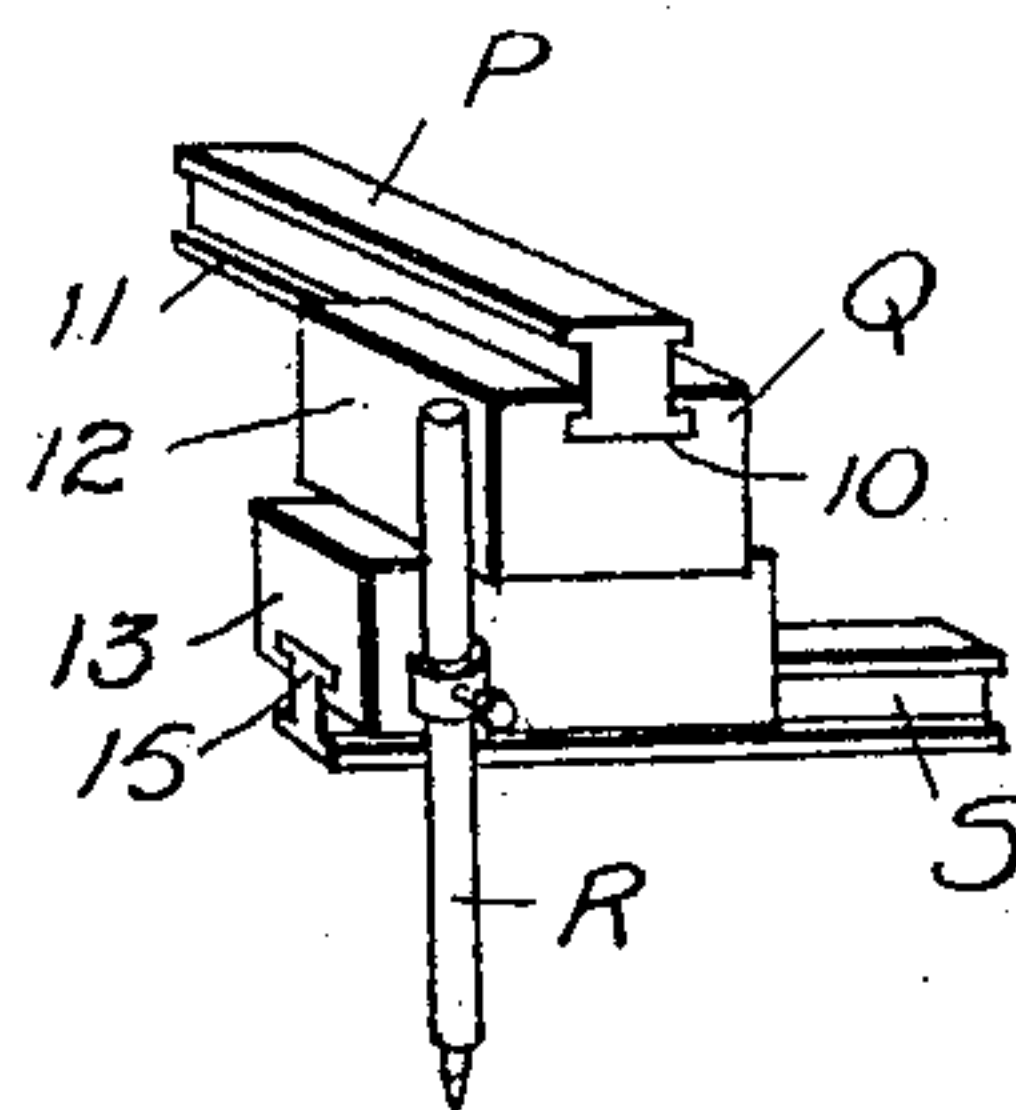


FIG. 7.

FIG. 8.



WITNESSES

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3 SHEETS—SHEET 3.

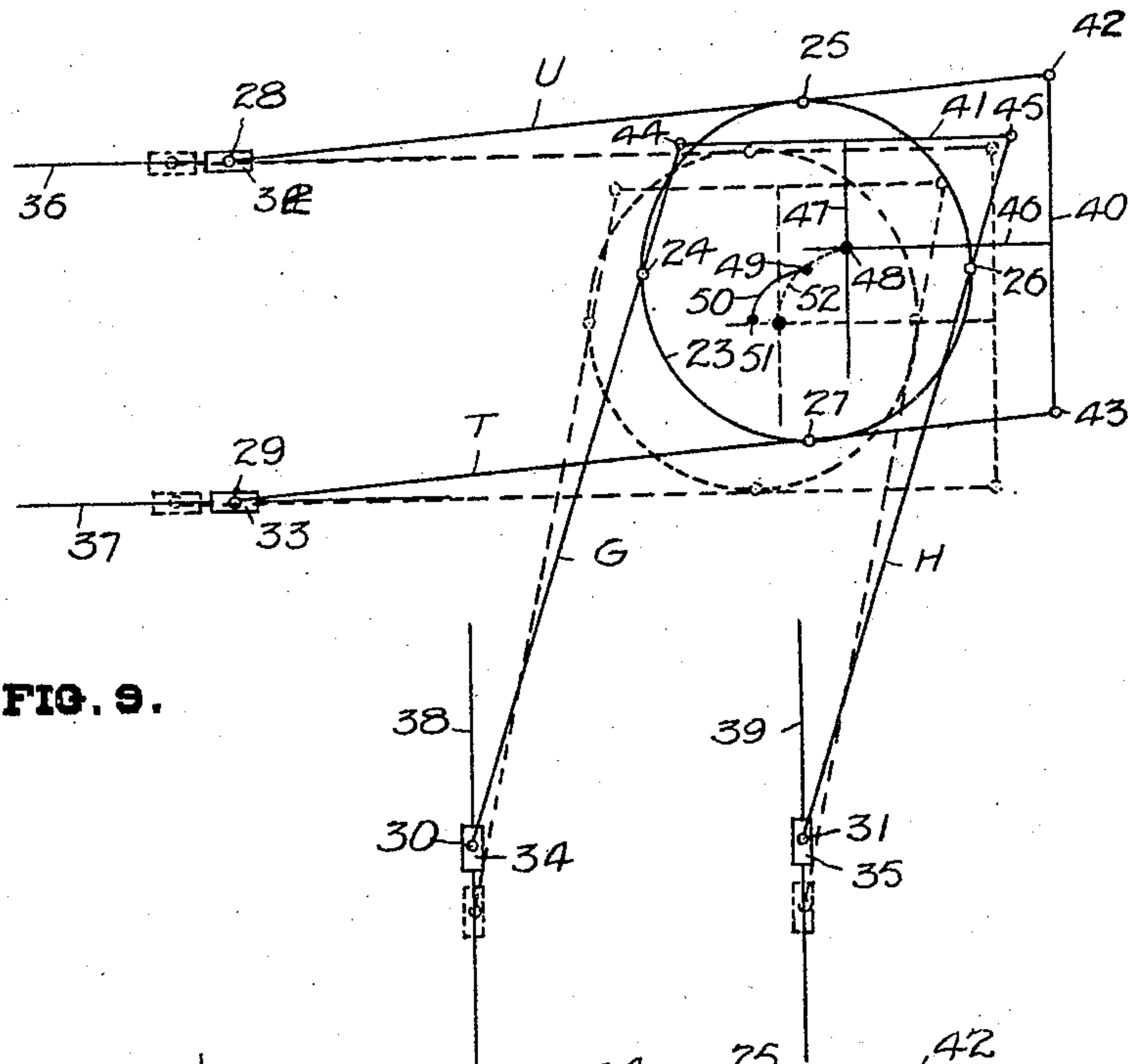


FIG. 9.

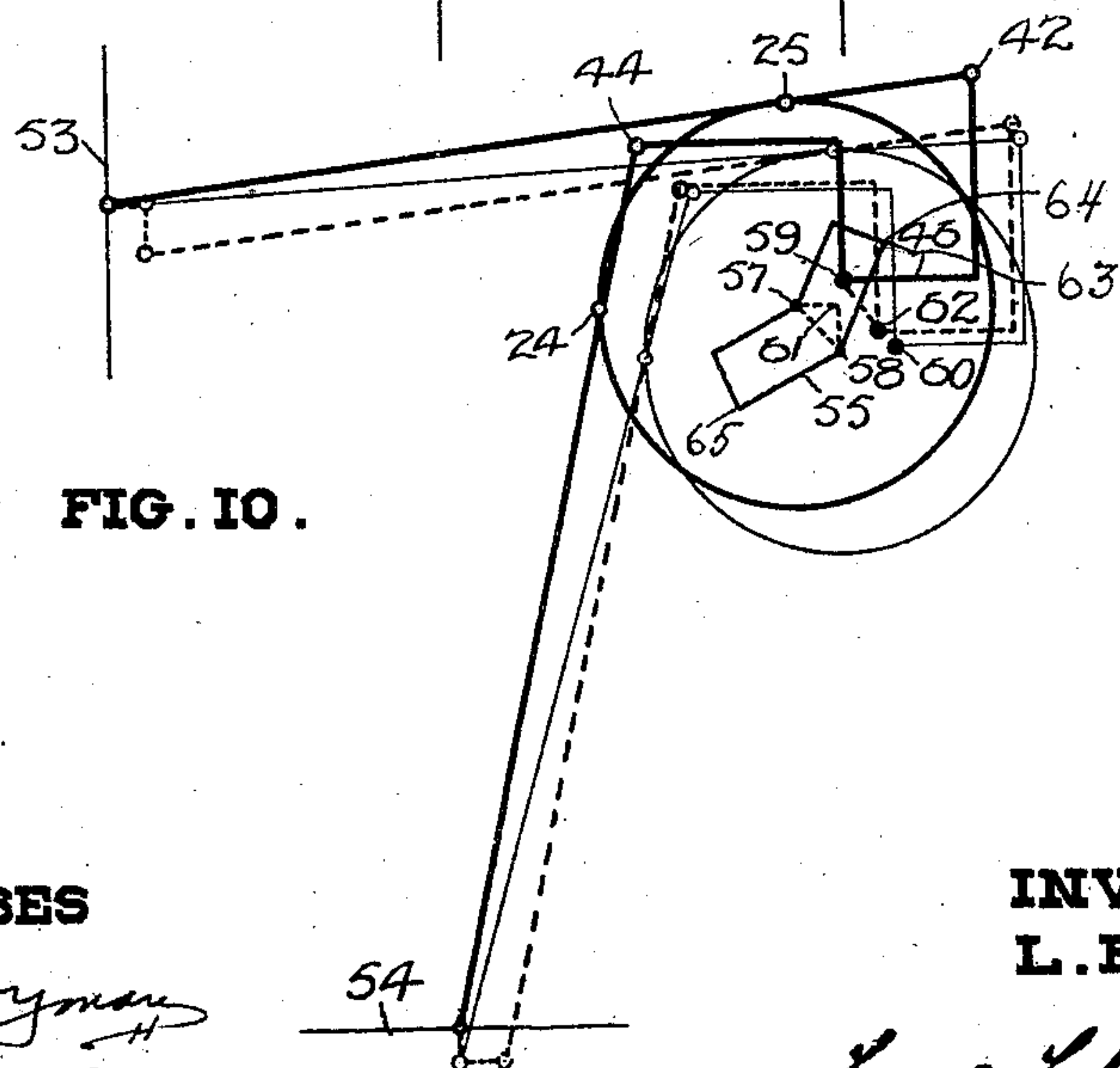


FIG. 10.

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UNITED STATES PATENT OFFICE.

LOUIS EUCLIDE CÔTÉ, OF OTTAWA, ONTARIO, CANADA.

PATTERN-GRADING MACHINE.

No. 878,046.

Specification of Letters Patent.

Patented Feb. 4, 1908.

Application filed May 23, 1906. Serial No. 318,424.

To all whom it may concern:

Be it known that I, LOUIS EUCLIDE CÔTÉ, of the city of Ottawa, in the county of Carleton, Province of Ontario, Canada, having invented certain new and useful Improvements in Pattern-Grading Machines, do hereby declare that the following is a full, clear, and exact description of the same.

My invention relates to improvements in pattern grading machines and the objects of my invention are to provide a simple device by means of which a copy of a given pattern may be produced enlarged or decreased in different proportions in two directions where-
by from a single pattern a whole series of patterns may be produced accurately graded to correspond to the different sizes of article in which they are used, to provide means whereby the directions along which the increase or decrease shall take place may be changed, and to provide means whereby any enlargement or diminishment along a given direction may be prevented if desired.

In the manufacture of patterns for different sizes of boots, shoes and garments it is not sufficient to have each successive size a mere enlargement of the one preceding since the dimensions do not increase correspondingly in all directions. An instance of this may be seen in the patterns for the various sizes of shoes in which the length is increased in a very much greater proportion than the width.

Hitherto it has been the custom to form a different pattern for each size and as the formation of these original patterns would occupy a considerable amount of time it will be seen that the application of my invention will enable the patterns to be produced in a much more economical manner. The invention is also applicable to the enlargement of maps where it is desired to draw the map to a different scale in one direction than in the other.

In carrying out the invention a marking pencil or the like is secured to a movable block having transversely extending there-through slots in which rods are slidably held extending at an angle to each other. Means are provided for giving a parallel movement to each of the rods and for communicating respectively to each of them the motion of a follower perpendicular to their direction and increased or decreased in a given ratio. The movement of the block carrying the marker has thus the joint movement of the

two rods and as these correspond to the movement of the follower in two given directions only increased or decreased in a given ratio it will be seen that the motion of the marker will be the motion of the follower increased or decreased in two given directions in different ratios, the details of the construction being fully set forth and described in the accompanying specifications and drawings.

Figure 1 is a plan view of an embodiment of my invention. Fig. 2 is an enlarged sectional view on the line 2—2 Fig. 1. Fig. 3 is a sectional view on the line 3—3 Fig. 1. Fig. 4 is an enlarged sectional view on the line 4—4 Fig. 1. Fig. 5 is an enlarged sectional detail of the follower swivel. Fig. 6 is an enlarged sectional view on the line 5—5 Fig. 1. Fig. 7 is a sectional view showing a form of support for the original pattern. Fig. 8 is an enlarged perspective detail of the block carrying the marking pencil. Fig. 9 is a diagrammatic view showing the apparatus in two positions. Fig. 10 is a diagrammatic view illustrating the operation of the device as hereinafter described.

In the drawings like letters of reference indicate corresponding parts in each figure.

Referring to the drawings A is the pattern to be copied, preferably formed of stiff sheet metal, which is supported by any suitable form of standard *a* from the base plate B or other fixed support for the machine.

C is the follower swivel shown in detail in Fig. 5 which may be of any desired form and as shown comprises a small wheel *c* having a grooved periphery engaging the edge of the pattern, a plate *d* to which a pin extending through the wheel is secured and a pin *e* downwardly extending from one end of the plate in line with the periphery of the wheel *c* and rotatably secured in the top *f* of the bracket D. The bracket D has downwardly and inwardly extending portions *g* and *h* integral with each end thereof which extend between and are secured to two flat annular rings E and F which are adjustably held with regard to each other by means of bolts *i* extending through slots *j* provided in each plate. It will thus be evident that the rings may be adjusted in angular relation to each other.

To diametrically opposite points *k* and *l* on the upper ring E levers G and H preferably circular in cross-section, are pivoted the outer ends of said levers being connected by

a suitable link bar I having standards m and n downwardly extending from the pivoting points and resting on the upper smooth surface of the base plate B. The opposite ends of the levers are connected by a link bar J which is slidably held in a casing K and locked in any position therein by suitable means such as thumb-screws p extending through the sides of the casing. Preferably the connection between the ends of the levers and the link bars is in the form of straps p encircling the levers having pintles q downwardly extending from the underside thereof into the link bar J and thumb-screws r extending through the top thereof which bear against the levers and so hold the straps in any adjusted position.

To the center of the underside of the casing K a slide L is rigidly secured which is inclosed by a casing M which extends in a direction at right angles to the casing K. For purposes of adjustment hereinafter described provision is made for variation in the angular position of the casing M. The means I show to accomplish this purpose comprise a pivoting pin s extending through the casing and through the base plate B and through a block t interposed between the two and secured to the underside of the casing M. The casing is fixed in any adjusted position by means of an arc sector N fixed to the base and through the slot u in which a pin v secured to the block t and having thereon a thumb-screw or other means of securing it in any position along the arc sector.

Scales w are provided on each lever and straps x and y encircle the levers and are secured in position at corresponding graduations of the scale by means of set-screws y extending therethrough. These straps preferably extend only partially around the levers as shown in Fig. 4 in order that they may be slid freely over the top of the plate E to which the levers are pivoted. The tops of these straps are connected by a bar or plate O which is pivoted to each and fixed to the center of the underside of the plate and at right angles to the line joining the pivoting pins thereof is a rod P which extends through a transverse groove 10 provided in the top of a block Q which carries the marking pencil R. Preferably this bar is formed at the bottom with outwardly extending flanges 11 which engage recesses provided in the groove 10. The block Q carrying the pencil or other marking means is preferably formed of two separate blocks 12 and 13 which are centrally pivoted together by means of a pin 14. In the underside of the block 13 a transverse groove 15 is provided corresponding to the groove 10 and through which a bar S extends similar in form to the bar P. This bar in the embodiment shown is integral with a plate T which is pivoted to straps 16 and 17 which partially encircle two levers U' and U

corresponding in form and size to the levers G and H and which are pivoted at 18 and 19 to the underside of the plate F, the said pivoting points being diametrically opposite to each other. The outer ends of these levers are connected by an ordinary link bar V and the inner ends are encircled by straps 20 of similar construction to the straps o and which are pivotally secured to a link bar inclosed by and adjustably held in a casing X, the underside of which is secured to a slide Y which reciprocates in a casing Z which is adjustably supported in exactly the same way as the casing M. Suitable scales are provided on the levers U and F similar to the scales w .

Having now described the various parts of my mechanism I will point out the operation of the same.

Usually the device is employed with the two casings M and Z at right angles to each other which will cause the slides L and Y to reciprocate in directions at right angles to each other. The straps x , y and p are then placed at the graduations on the levers G and H which correspond to the proportion in which it is desired to increase or decrease the pattern at right angles to that direction in which the slide L is reciprocated. Straps 16 and 17 and 20 are then adjusted to the position on the scales which correspond to the desired proportion of increase along the direction at right angles to that in which the slide Y reciprocates. The graduations of each of the levers G and H corresponding, the bar O will be parallel to the link bar J and hence it can only move parallel to the link bar J and the bar P secured thereto can only move parallel to itself and to the slide L. In a similar manner the bar S can only move parallel to the slide Y.

Assuming that the casing M is fixed and the levers G and H rock about their pivoting points the amount of motion of the straps x and y in a direction at right angles to the movement of the slide L will be greater or smaller than that of the pivoting point k and l in the ratio of the distance from p to x to the distance from p to k and the rod P will move parallel to itself a distance greater or smaller than either the points k and l move in the same ratio and the block Q will be forced by the rod P to move in a direction perpendicular to the rod the same distance that the rod moves parallel to itself. In the same manner if the casing Z were fixed the motion of the rod S parallel to itself would be the motion of either the points 19 or 20 increased or decreased in the ratio of the distance from 20 to 17 to the distance from 20 to 19. When the movement takes place in both directions simultaneously it is evident that the ultimate result effected will be just the same and the motion of the marking block Q will be the combination of the movements of

the two rods P and S perpendicular to themselves respectively.

Now the pivoting points *k* and *l* have the same motion along the line joining *k* and *l* as the center 22 of the ring has and the points 18 and 19 have the same motion along the line joining 18 and 19 as the center 22 has. It will thus be seen that the movement of the center 22 will be the same as the combined movement of the points *k* and 19 or *l* and 18 and thus the movement of the block Q will be the movement of the center 22 enlarged or decreased in the directions at right angles to the rods P and S in the proportions corresponding to the graduations at which the plates supporting the rods are set. The straps *p* and 20 enable the proportion between the two parts of the levers to be easily adjusted. This may be seen more clearly by reference to the diagrammatic view in Fig. 9 in which the circle 23 represents the annular plates E and F and 24, 25, 26 and 27 are the points thereon at which the levers G, H, U and U' are pivoted. 28, 29, 30 and 31 are the points at which the ends of the levers are pivoted to the slidably held link bars J and Y which may be represented diagrammatically by slides 32, 33, 34, and 35 pivoted to each end of the levers and operating on tracks 36, 37, 38 and 39. 40 and 41 represent the plates O and T the straps on which are adjustably pivoted at points 42, 43, 44 and 45. The lines 46 and 47 represent the rods P and S and their point of juncture 48 will be the position of the block supporting the marking pencil. 49 is the center of the ring 23 and will represent the point of contact of the follower C. The full lines indicate one position of the apparatus and the dotted lines another. The center 49 is moved along a path 50 to a new position 51 during which movement the rods 46 and 47 are moved and the locus of their intersection is the dotted line 52 which will represent the pattern traced out by the marking pencil.

It will be seen that the movement of the point 42 in a direction perpendicular to the track 36 will give an increase of the motion of the point 25 in the same direction in the proportion of the distance from 28 to 42 to the distance from 28 to 25. The movement of the rod 46 perpendicular to itself must be the same as the movement of the point 42 in the same direction and this as before stated is an increase or decrease of the motion of the point 25 in a given ratio which has the same motion as the center 49 in that direction. In the same manner the motion of the rod 47 perpendicular to itself is an increase or decrease of the motion of the center 49 in the direction at right angles to either of the tracks 38 or 39 in the ratio of the distance from 30 to 44 to the distance of from 30 to 24. The movement of the marking pencil which is the combination of the two parallel move-

ments of the rods 46 and 47 will thus be equivalent to the motion of the center 49 increased or decreased in the directions at right angles to the tracks 36 and 38 in different proportions.

I will now explain the object of providing transverse adjustment of the connecting bars J and W which may be more clearly seen by reference particularly to Fig. 10. As hereinbefore explained these bars may be adjusted in the casings K and X in which they are held but normally they will be held in a fixed position within the said casings. The object of this adjustment is to provide for the enlargement of certain classes of peculiarly formed patterns in certain given directions but not in others.

In the diagrammatic view 53 and 54 are the directions along which ordinarily enlargement would take place and 55 is the pattern of the shape indicated and which it is desired to enlarge in length but not in breadth. 58 and 57 are two corresponding points on opposite edges of the pattern and it is desired to have the distance 57, 58 constant. The various parts of the apparatus are indicated in Fig. 10 one of each pair of levers and one half of the connecting bars having been omitted from the diagram to render the same clearer. 59 is the point at which the marking pencil will be when the follower is at 57, the parts of the apparatus being indicated in this position in heavy lines. 60 is the point at which the pencil will be under ordinary circumstances, when the follower is at 58 the distance 59 to 60 being an enlargement of the distance 57—58. To prevent this undesirable change taking place the device is operated as follows: The follower is started at the lower corner 65 of the pattern and moved around the same until it comes to the opposite corner 64, by which time the marker will have moved to a point 63, due to ordinary operation of enlargement. Lines are then drawn through the points 57, 58 parallel to the directions 53, 54 and intersecting at 61. The link bar J, is then moved laterally parallel to the direction 54, a distance equal to the distance 57—61 and the link bar W is moved laterally parallel to the direction 53 a distance equal to the distance 58, 61. This will cause the marking pencil to be moved from the point 63 to the point 64, the direction 63, 64, being parallel to the direction 57, 58. The follower is then moved down the side of the pattern which will cause no enlargement to take place along the direction 57—58. The free tracing movement of the device is thus interrupted at one point to take away the enlargement produced in a given direction from that point. The relative change of result accomplished by this movement is shown in the drawings where 59—60 is the distance the marker moves while the follower moves from

57 to 58 and 60 to 62 is the enlargement which is cut off by the arbitrary movement of the ends of the levers which movement will shorten or lengthen of the same quantity
 5 all the lines parallel to 57—58.

When it is desired to change the direction along which the increase or decrease in size shall take place the thumb screws operating on the arcs N are loosened and the casings M
 10 and Z adjusted into the new positions. At the same time the bolts *i* locking the two plates E and F together are loosened and the plates adjusted to correspond to the new position of the casings which will turn the
 15 link-bars J and W a certain amount. The adjustment of the marking block will be provided for by the two parts being pivoted together. It will thus be seen that the increase or decrease in size may be made along
 20 any two desired directions.

With reference to the scales on my device it will be observed that the divisions on each are equal and that the machine may be quickly and easily set at any given proportion equal divisions on the scales representing equal differences in ratio. This may be
 25 more clearly explained as follows: Assuming the length of each division is represented by *a* and that there are no divisions from the pivoting point or plate E to the point at which the plate O is secured and that *m* represents the distance from the pivoting point of E to the end of the lever. Then the ratio of decrease for any given setting is the fraction
 30 $\frac{na}{m}$. For the next graduation nearest the piv-

oting point the ratio will be $\frac{n-1}{m}a$ and for
 40 the next $\frac{n-2}{m}a$ the difference between each ratio being $\frac{a}{m}$. The increase and decrease is thus always expressed by a fraction of the
 45 form $\frac{n}{m}$ and this ratio is obtained by setting

independent indexes on suitable scales at divisions corresponding to the numbers *n* and *m*.

It will thus be seen that I have devised an
 50 exceedingly cheap and simple form of pattern grading machine by means of which a pattern may be enlarged or decreased in size in different proportions in two different directions and by means of which the enlargement in a given direction may be prevented.
 55

The particular means used to obtain a parallel movement of the rods P and S may be varied to suit different circumstances and different classes of work and while I have
 60 described the preferred form yet there are numerous other equivalent forms which would serve the same purpose. If desirable the means for changing the direction along which enlargement shall take place might be
 65 omitted and the plates E and F combined

into a single plate. It will therefore be readily understood that while I have described with great particularity of detail one specific embodiment of my invention yet the invention is not limited thereto as changes
 70 might be made in the details of the construction within the scope of the appended claims without departing from the spirit of the invention.

What I claim as my invention is:—

1. In a device of the class described the combination with the means for producing a copy of a pattern normally enlarged or decreased in two different directions in different proportions of mechanical means operable independently of the means for producing the
 80 copy for shifting the point at which the contour of any given side of the copy shall start.

2. In a device of the class described the combination with a marker and the follower
 85 of means for transmitting the movement of the follower to the marker and enlarging or decreasing it in two given directions in different proportions and means for adjusting the transmitting means to change the angular
 90 relation of the two directions of enlargement or decrease as and for the purpose specified.

3. In a device of the class described the combination with the follower and marking
 95 means of means for communicating the motion of the follower in a given direction and simultaneously increasing or decreasing the amount of motion so transmitted, means for transmitting the motion of the follower in a
 100 direction inclined to the first direction to the marker and simultaneously increasing or decreasing the amount of motion transmitted, means for varying the ratio of increase or decrease of the motions in either direction and
 105 means for adjusting the transmitting means to change the angular relation of the two directions of enlargement or decrease as and for the purpose specified.

4. In a device of the class described the
 110 combination with the marking means, a block supporting the same having two slots transversely extending therethrough in different directions, of two rods extending
 115 through said slots respectively and slidable therein, a follower, means operated by the follower for giving each rod a parallel movement and means for increasing or decreasing the amount of motion transmitted from the
 120 follower to the rods in different ratios for each rod as and for the purpose specified.

5. The combination with the follower and the supporting means therefor, of a lever pivoted to the supporting means, and having
 125 a scale thereon, means permitting a sliding movement of the end of the lever in a given direction, a follower, means for giving the follower the movement of a point on said lever in a given direction, and means for adjusting the said means to change the point,
 130

the ratio of increase or decrease of the movement of the marker in a given direction over the movement of the follower, being the ratio of the distance from the end to the pivoting point of the lever to the distance from the pivoting point to the said adjustable point, as and for the purpose specified.

6. In a device of the class described the combination with two rods and means for imparting a parallel movement to each, of marking means controlled by the joint movement of the two rods and means for adjusting the means producing the parallel movements to change the directions of enlargement or decrease as and for the purpose specified.

7. In a device of the class described the combination with the marking means and a block supporting the same having slots transversely extending therethrough at an angle to each other, of rods extending through said slots and means for moving each rod parallel to itself as and for the purpose specified.

8. In a device of the class described the combination with the block supporting the marking means and formed in two parts adjustable in angular relation towards each other, of a slot in each part of the block, rods extending through each slot and means for moving each rod parallel to itself as and for the purpose specified.

9. In a device of the class described the combination with the two rods and means for preventing any but a parallel motion of each of marking means controlled by the joint movement of the rods, a follower, and means for communicating the motion of the follower to the rods enlarged or decreased in different ratio for each rod as and for the purpose specified.

10. In a device of the class described the combination with the follower and supporting means for the same, of two levers pivoted to the supporting means, means for restraining the movement of one end of each lever to a sliding movement in a given direction, a marker, means for giving to the marker the combined motion of a point on one lever parallel to a given direction and of a point on the second lever parallel to a direction at an angle to the first and means for varying the direction of movement of the ends of the levers as and for the purpose specified.

11. In a device of the class described in combination a marking means, a block supporting the same having slots therein, in opposite directions, rods extending through said slots, means for causing said rods to always move parallel to themselves, a follower, and supporting means for the same, levers pivoted to the supporting means, means for restraining the motion of one end of each lever to a sliding movement in a given direction and means for giving to the

marker the combined motion of a point on one lever parallel to a given direction and of a point on the second lever parallel to a direction at an angle to the first as and for the purpose specified.

12. In a device of the class described the combination with the follower and supporting means for the same, of two pairs of levers pivoted to the same and having their pivoting points in lines inclined at an angle to each other, means for fixing the ends of each pair of levers with freedom to slide in given directions, cross-bars connecting the pairs of levers intermediate of their length and adjustably held thereon, marking means and means for communicating the motion of the cross-bars in given directions thereto as and for the purpose specified.

13. In a device of the class described the combination with the follower and supporting means for the same, of two pairs of levers pivoted to the same and having their pivoting points in lines inclined at an angle to each other, means for fixing the ends of each pair of levers with freedom to slide in given directions, cross-bars connecting the pairs of levers intermediate of their length and adjustably held thereon, rods fixed to the cross-bars, a marker, a block supporting the same having slots extending therethrough in which the rods slide as and for the purpose specified.

14. In a device of the class described in combination a follower, a plate, means for supporting the follower from the plate, two pairs of levers pivoted to the plate having the pivoting points in lines inclined at an angle to each other, connecting bars connecting the inner ends of each pair of levers, a slide secured to each of the connecting bars, a casing within which the slides reciprocate, cross-bars adjustably held on the levers, rods secured thereto, marking means, a block supporting the same having transverse slots therethrough through which the rods extend as and for the purpose specified.

15. In a device of the class described in combination a follower, a plate, means for supporting the follower from the plate, two pairs of levers pivoted to the plate, link bars connecting the inner ends of said levers, casings inclosing the link bars, means for fixing the link bars in any position to which they have been adjusted, slides pivoted to the underside of the casings, casings inclosing the same within which they may reciprocate, cross-bars adjustably held on each pair of levers, rods secured to said cross-bars, marking means, a block supporting the same, having slots therein through which the rods extend as and for the purpose specified.

16. In a device of the class described in combination a follower, two similar plates, a bracket supporting the follower from the one plate, a pair of levers pivoted respectively to

each plate, link bars connecting the inner ends of the same, a slide centrally secured to the link bars, casings within which the same reciprocate, means for adjusting the angular position of the casings, cross-bars adjustably held on the levers, rods secured thereto, marking means, a block supporting the same formed in two parts adjustable in angular relation to each other and a slot in each of the parts of the block through which the rods extend as and for the purpose specified.

17. In a device of the class described in combination a follower, supporting means for the same, two levers pivoted to the supporting means, means for restraining the motion of one end of each lever, to a sliding movement in a given direction, means for laterally adjusting the position of the ends of the levers, a marker, and means for giving to the marker the combined motion of a point on one lever parallel to a given direction and of a point on the second lever parallel to a direction at an angle to the first as and for the purpose specified.

18. An improved pattern grader comprising a follower, a swivel, two similar plates, means for securing the same together adjustable in angular position with regard to each other, a bracket supporting the swivel from one plate, a pair of levers pivoted to each plate, link bars connecting the inner ends of said levers, casings inclosing the same, means for locking the link bars in any adjusted position in said casing, a slide pivoted to the underside of the casing, a casing inclosing the same, means for adjusting the angular position of the casing, cross-bars adjustably held on each pair of levers, rods secured thereon, two blocks, pivoting means connecting the same, a slot in each block through which the rods extend and marking means supported from one block substantially as described.

19. In a device of the class described the combination with the follower and supporting means for the same, of two levers, pivoted to the supporting means at two different points, two slides operating in different directions, means for adjustably securing one lever to each slide, a marker, and means for giving to the marker the combined motion of a point on one lever parallel to a given direction and of a point on the second lever parallel to a direction at an angle to the first as and for the purpose specified.

20. In a device of the class described the combination of means for producing a copy of a pattern enlarged or decreased without distortion, along two directions inclined at an acute angle to each other and means for adjusting the said means to vary the angle between the two directions as and for the purpose specified.

21. In a device of the class described the combination with means for producing a

copy of a pattern enlarged or decreased in different proportions in two directions which may be inclined to each other at any angle, the enlargement of all lines parallel to one direction being in the same proportion and the direction of any two given lines not being changed when reproduced of means for adjusting the aforesaid means to independently change the said directions.

22. In a device of the class described the combination with the follower and marker of means for analyzing the movement of the follower into two rectilinear movements, means for independently enlarging or decreasing each rectilinear movement and means for giving the marker the recombined movement of the enlarged or decreased rectilinear movements and means for independently adjusting the directions of the rectilinear movements.

23. In a device of the class described, the combination with the follower and two pivoted levers having their ends supported with freedom to slide in two given directions of means for causing the follower to have the combined movement of a point on each lever, a marker means for causing the marker to have the combined movement of two other points on the said levers and means for independently changing the directions in which the ends of the levers slide.

24. In a pattern grading machine, the combination with the follower, the marker, of means for transmitting the motion of the follower to the marker, enlarged or decreased in a number of different proportions, the said means including a lever, and means operated by a definite amount of movement of the lever, to arbitrarily shift the marker, the amount of shifting being proportional to and varying with the ratio of enlargement or decrease.

25. In a device of the class described the combination with the marker and the follower of means for communicating the motion of the marker to the follower in a number of different ratios, each of which may be indicated by the numbers n or m , the said means having scales thereon with the divisions corresponding to the numbers n and m , and adjusting means having indexes co-acting with the said means whereby when the indexes are set to the divisions corresponding to the numbers n and m , $\frac{n}{m}$ will be the ratio of the enlargement or decrease, as and for the purpose specified.

Signed at the city of Ottawa, in the Province of Ontario, this 21st day of May, 1906.

LOUIS EUCLIDE CÔTÉ.

Witnesses:

RUSSELL P. SMART,
WM. A. WYMAN.