

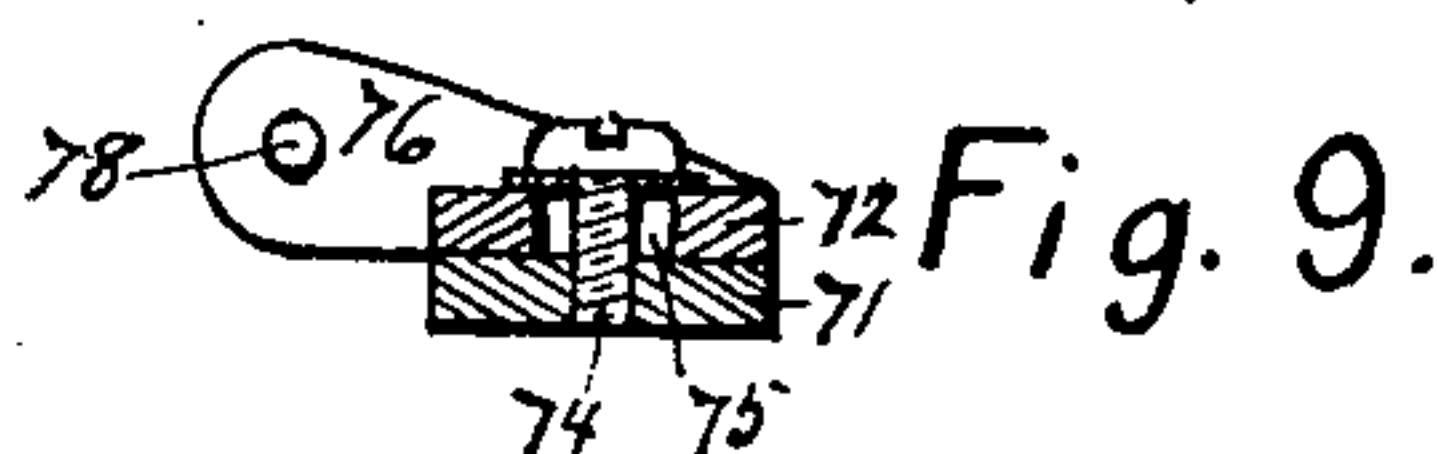
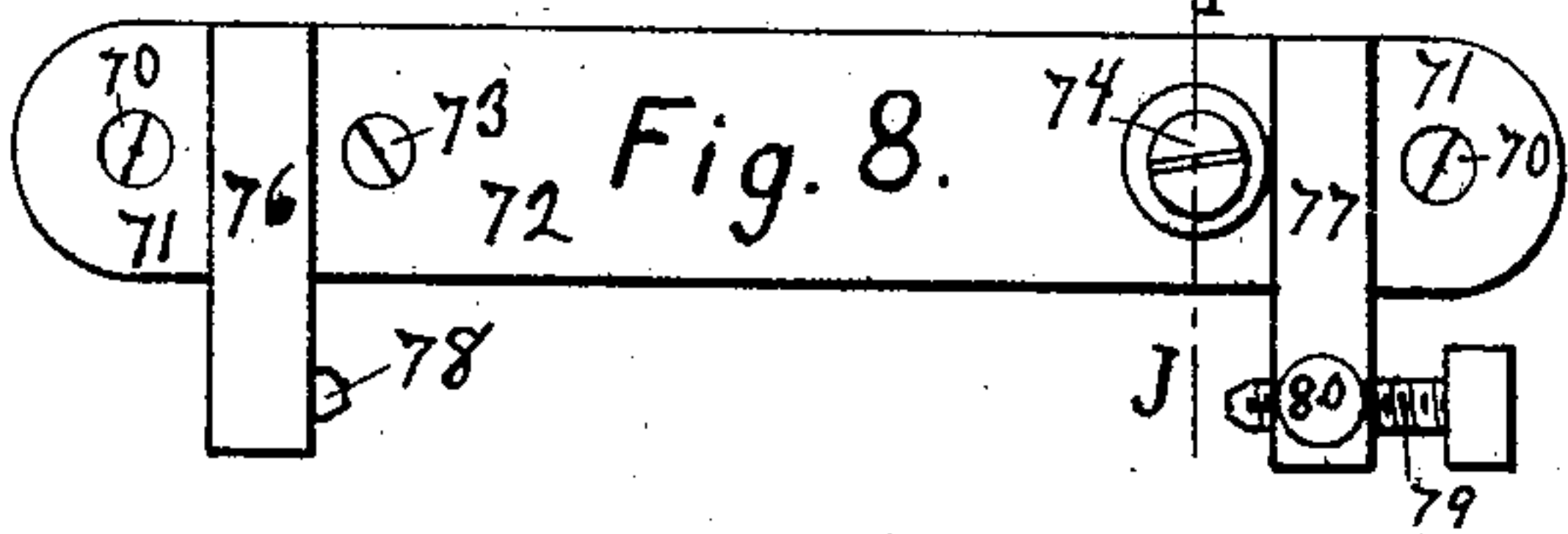
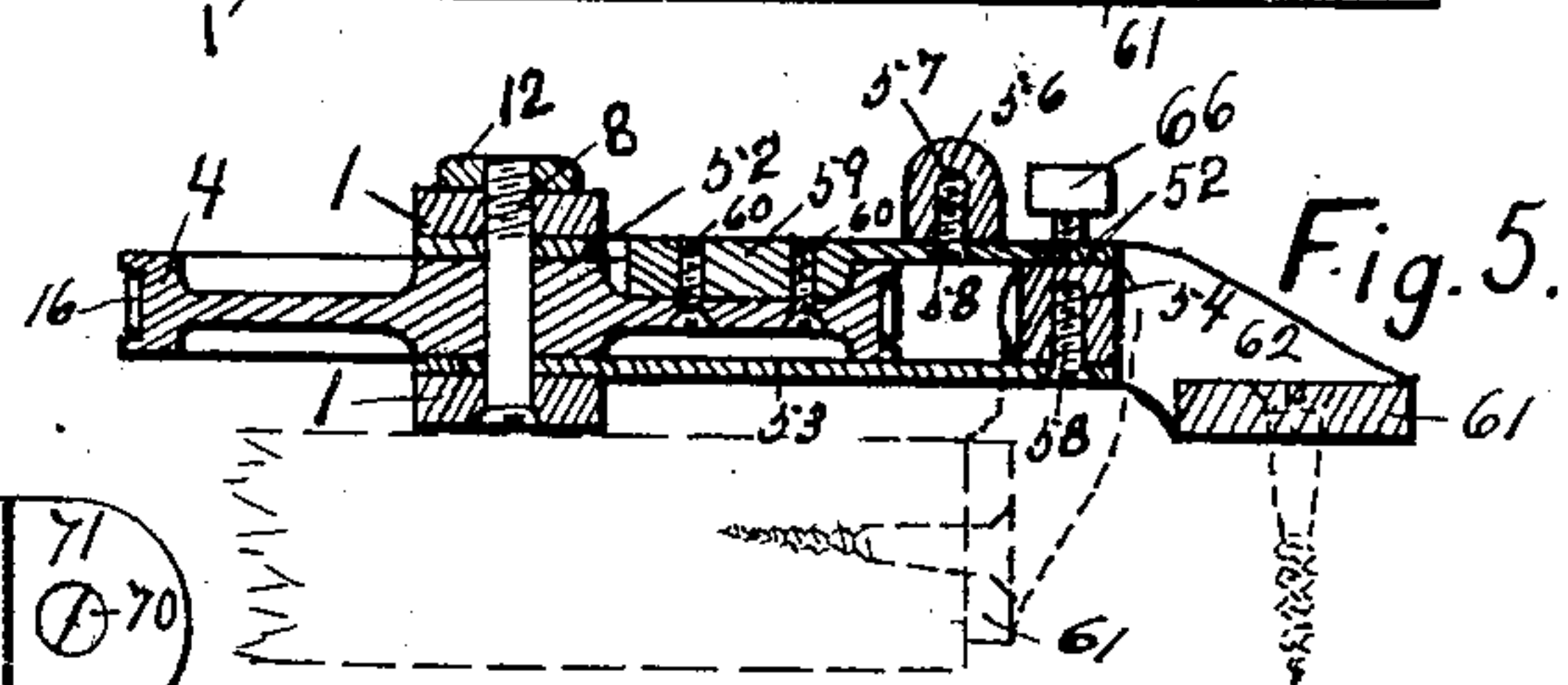
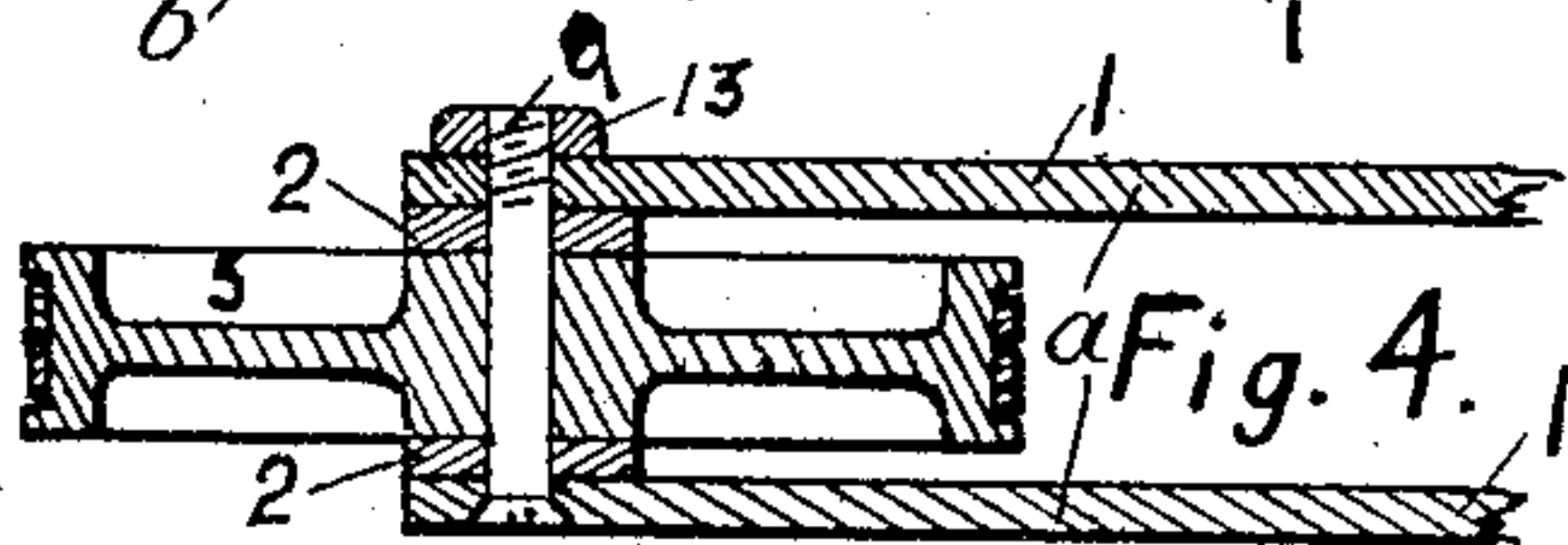
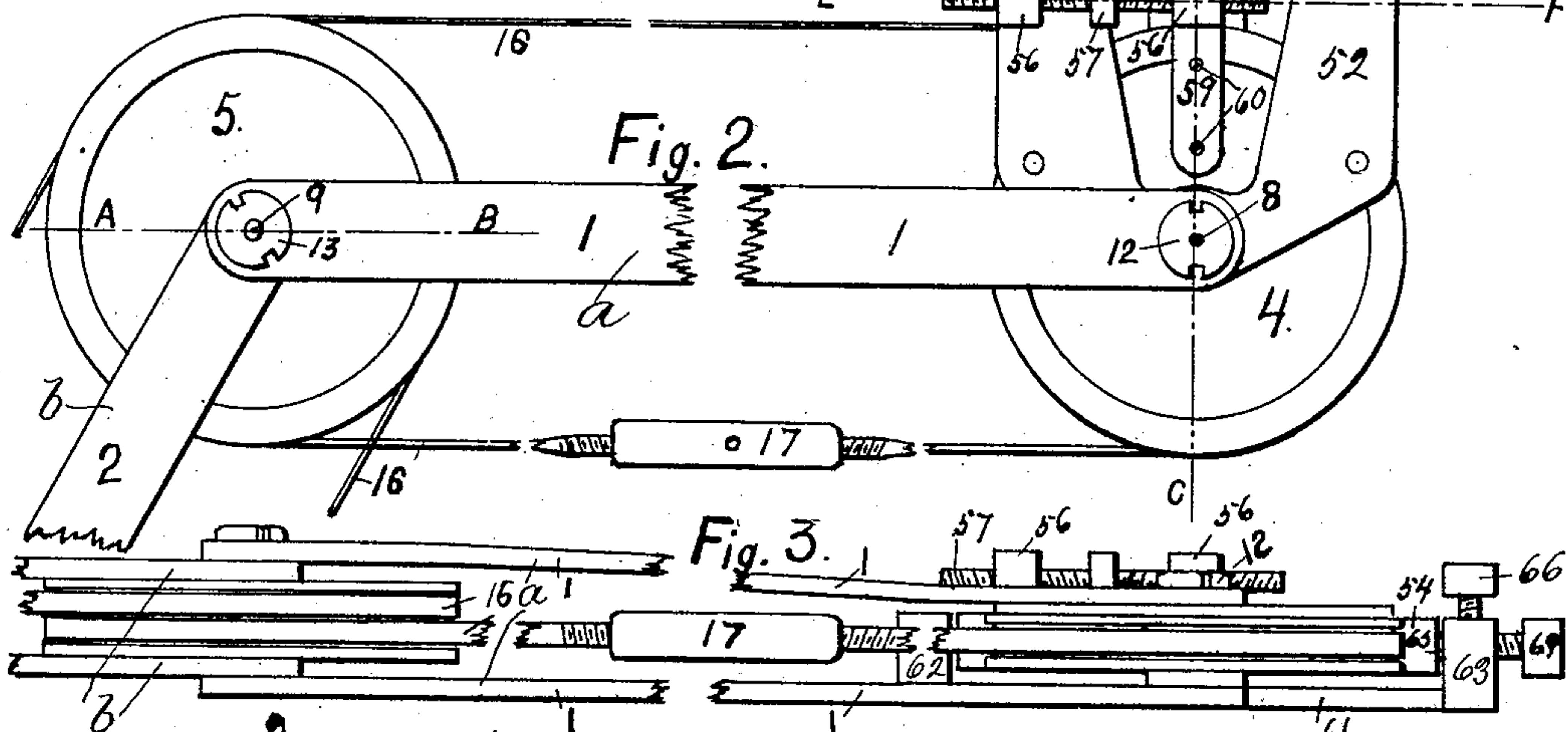
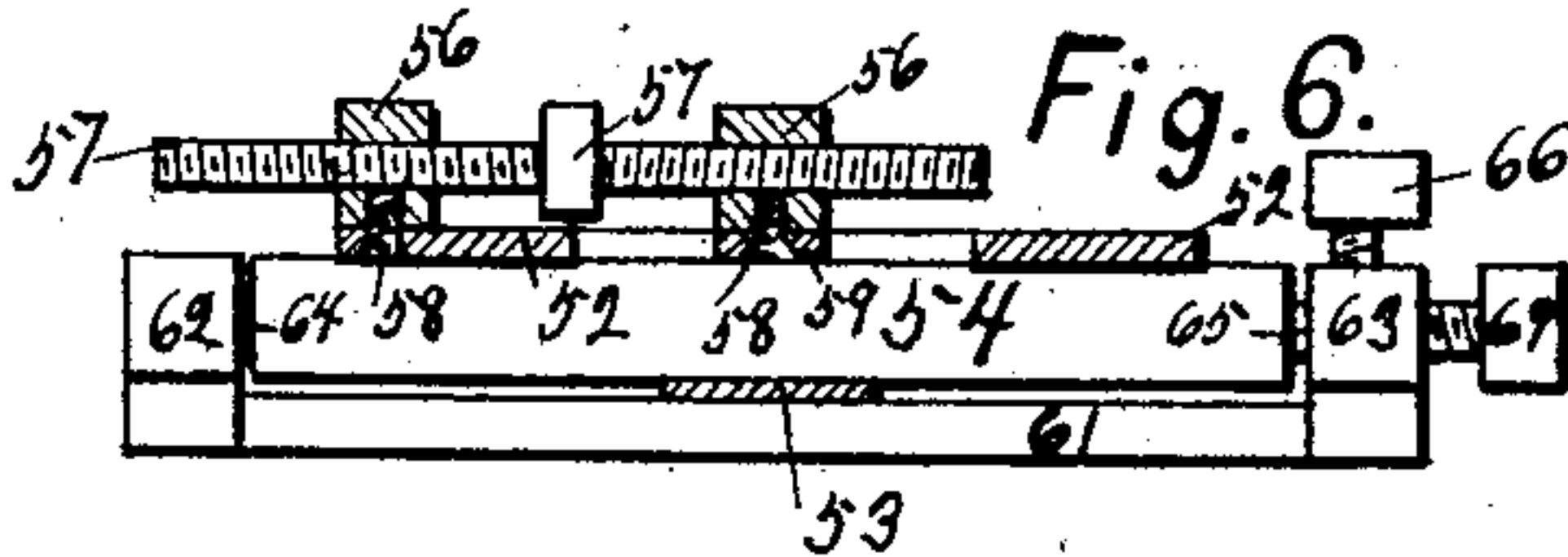
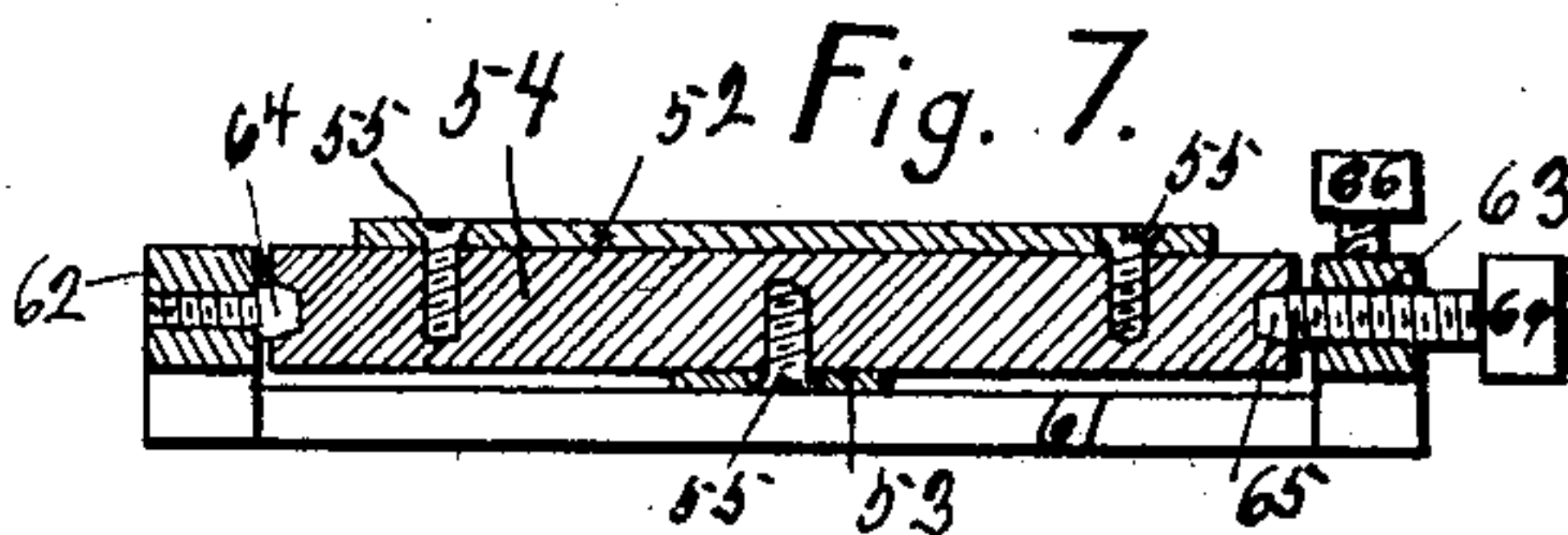
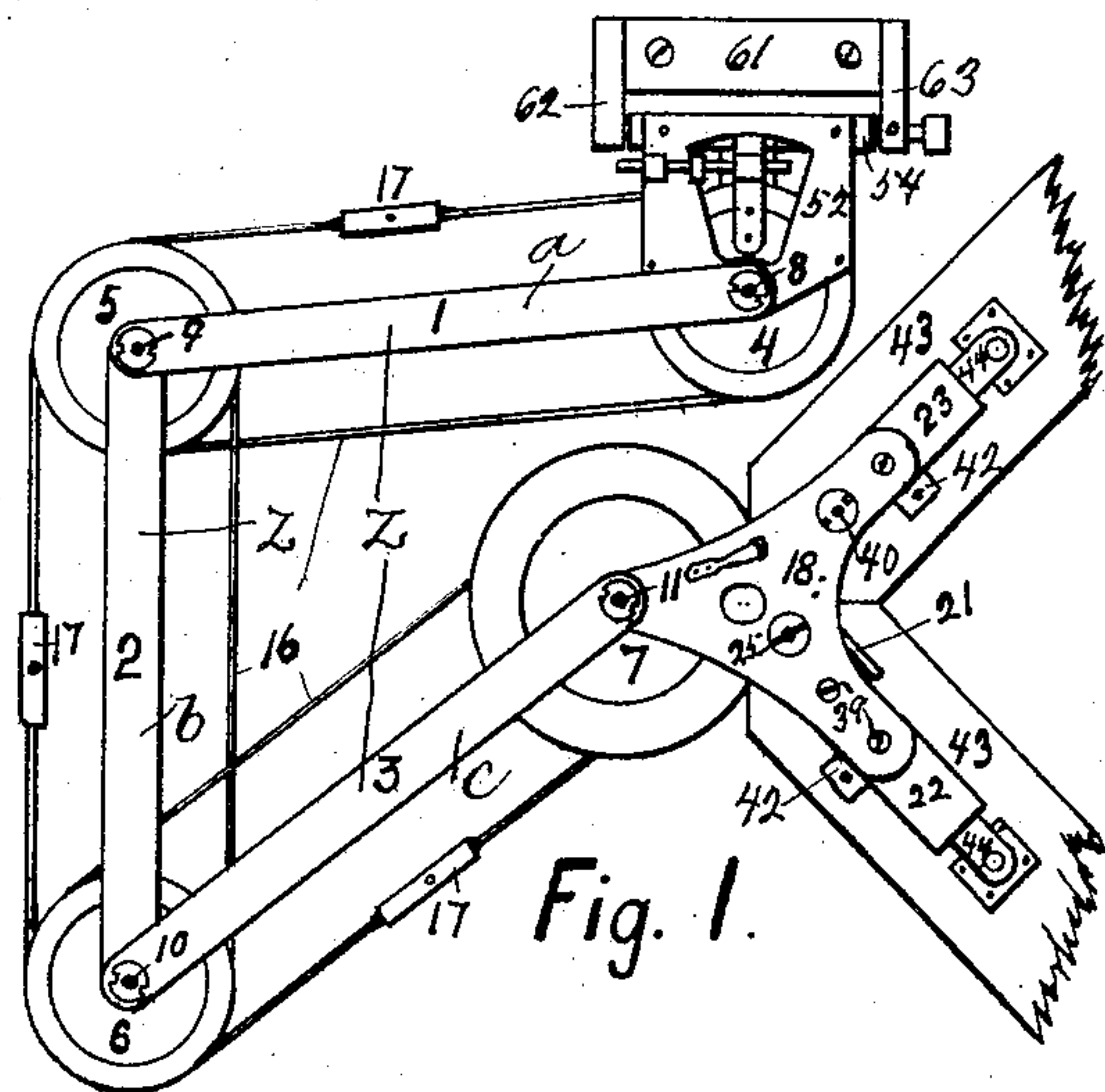
No. 859,917.

PATENTED JULY 16, 1907.

W. W. CLAUS.  
UNIVERSAL DRAFTING MACHINE.

APPLICATION FILED SEPT. 20, 1906.

2 SHEETS—SHEET 1.



Witnesses.

James Carlton Nelson  
Charles John Emery

Inventor.

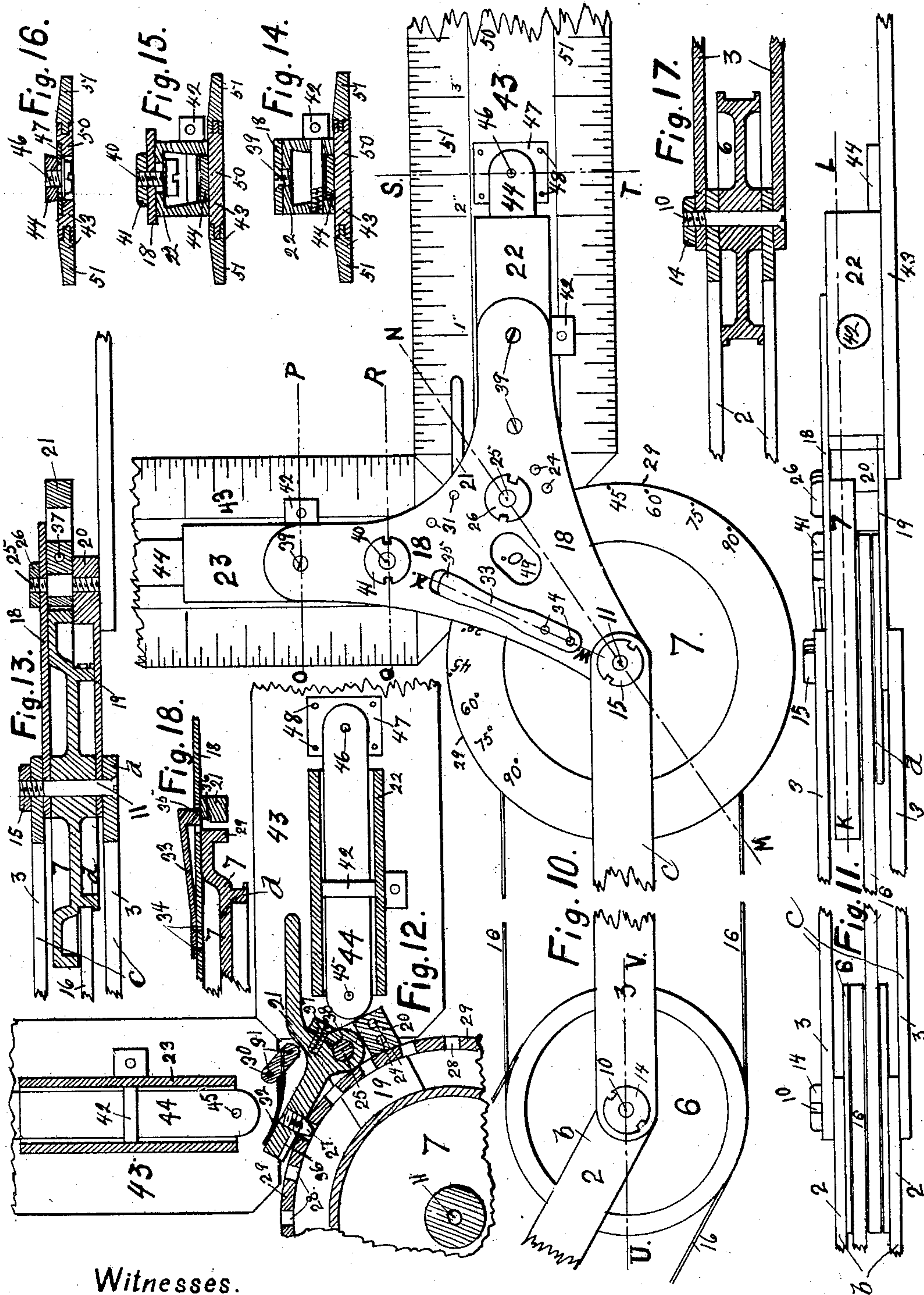
Wesley William Claus.

No. 859,917.

PATENTED JULY 16, 1907.

W. W. CLAUS.  
UNIVERSAL DRAFTING MACHINE,  
APPLICATION FILED SEPT. 20, 1906.

2 SHEETS—SHEET 2.



Witnesses.

James Carlton Nelson  
Charles John Evers

Inventor.

Wesley William Claus.



# UNITED STATES PATENT OFFICE.

WESLEY WILLIAM CLAUS, OF DUBUQUE, IOWA.

## UNIVERSAL DRAFTING-MACHINE.

No. 859,917.

Specification of Letters Patent.

Patented July 16, 1907.

Application filed September 20, 1906. Serial No. 335,361.

*To all whom it may concern:*

Be it known that I, WESLEY WILLIAM CLAUS, a citizen of the United States, residing at Dubuque, in the county of Dubuque and State of Iowa, have invented a new and useful Universal Drafting-Machine, of which the following is a specification.

The object of my invention is to enable draftsmen to draw scaled lines in pencil or in ink in any direction from any point in a drawing surface; to determine the angle in which any line is drawn; to draw lines parallel to any line and to measure the distances between same in one operation; to draw any line and its perpendicular without altering the set of the machine, and furthermore to provide scaled rules that will enable the making of accurate measurements and still have ruling edges of sufficient thickness to withstand the wear along its edges and also to aid in preventing ink blots while ink lines are drawn along its edges. I accomplish these results by having flexible rules that have transparent edges of proper thickness and of sufficient width to admit the scaling and numbering to be done on its under surface and outer edges and by having two such scaled rules rigidly secured perpendicular to each other, so as to form a right angle with the zero marks on adjacent edges coincident and in means whereby said right angle may be conveniently set in any revolved position and while in this non rotatable position, free to be moved to any position on the drawing surface.

The following specification will set forth in detail the mode of construction of my device and the manner of its operation when taken in connection with the drawings accompanying the same.

Figure 1, is the plan or top view of the entire machine. Fig. 2, is a larger drawing of the upper part of Fig. 1. Fig. 3, is the vertical projection of Fig. 2. Fig. 4, is a vertical section on the line A—B in Fig. 2. Fig. 5, is a vertical section on line C—D in Fig. 2. Fig. 6, is a vertical section on line E—F in Fig. 2. Fig. 7, is a vertical section on line G—H in Fig. 2. Fig. 8, is a plan or top view of an adjustable anchor. Fig. 9, is a vertical section on line I—J in Fig. 8. Fig. 10, is a large drawing of the lower part of Fig. 1. Fig. 11, is a vertical projection of Fig. 10. Fig. 12, is a horizontal section on line K—L in Fig. 11. Fig. 13, is a vertical section on line M—N in Fig. 10. Fig. 14, is a vertical section on line O—P in Fig. 10. Fig. 15, is a vertical section on line Q—R in Fig. 10. Fig. 16, is a vertical section on line S—T in Fig. 10. Fig. 17, is a vertical section on line U—V in Fig. 10. Fig. 18, is a part of a vertical section on line W—X in Fig. 10.

Similar characters of reference refer to similar parts in all the figures.

My device is intended to be used in connection with drafting boards or surfaces and the means by which the rules are moved in various directions upon the board whereby lines parallel and at angles to each

other may be drawn, consists in a jointed arm made in sections and the sections pivoted together with one end of the arm preferably pivoted to a support hinged to an anchor, which is attached to the drawing surface and the other end of the arm to a head which maintains the same relative position to the support under all its various conditions and movements.

Referring to the drawings Fig. 1. Z represents the jointed arm which in this case consists in three sections *a*, *b*, and *c*. Section *a* consists of two rigid parallel bars 1 secured at one end to a pivot pin 8 on the opposite sides of a wheel or plate 4 secured to a fixed support. The pivot pin passes loosely through the lower bar, through the wheel and is screwed into the upper bar which is further rigidly held on the pivot pin 8 by the binding nut 12, the other ends of the bar 1 are similarly held on opposite sides of the wheel 5 by the pivot pin 9 and a binding nut 13. Section *b* consists of two parallel bars 2 which are at one end pivoted on the pivot pin 9 between the bars 1 and on opposite sides of the wheel 5 and the other ends of the bars 2 are pivoted upon the pivot pin 10 on opposite sides of the wheel 6. This leaves the wheel 5 and the parallel bars 2 free to revolve on the pivot pin 9. Section *c* consists of two similar bars 3, secured at one end to the pivot pin 10 on opposite sides of the wheel 6 and outside of the bars 2. The pivot pin 10 passes through the lower bar 3, through the wheel 6 and bars 2 and screws into the upper bar 3, which is additionally secured to the pivot pin 10 by the binding nut 14. The other ends of the bars 3 are secured on the pivot pin 11 on opposite sides of the wheel 7, the pivot pin passing loosely through the lower bar 3, through the wheel 7 and screws into the upper bar 3 and further held firm by the binding nut 15. The wheels 4, 5, 6, and flange *d* on wheel 7, are each provided with flanged edges to prevent the belts hereinafter to be described from slipping off when in their movements about the wheels. These wheels and flange *d* of wheel 7 are of the same diameter and are kept in constant relation with each other by said belts. I have shown two wheels and three sections between wheels or plates 4 and 7, but it is manifest that a greater or less number of sections and of greater or less length, with the wheels may be arranged between said wheels 4 and 7 according to the range it is desired to move the scale rules hereinafter to be described. I have also shown 4, 5, 6, and 7 in the form of wheels but it is manifest that other forms may be used and still be within the spirit of my invention. The bands or belts 16 are preferably made of metal having their ends threaded and united by a right and left threaded nut 17. These bands join adjacent wheels in the jointed arm, by traveling around the wheels in like directions unwinding from one side of one wheel and winding onto the same side of the adjacent wheel. The bands preferably are not



connected with each other but may be tightened independently of each other by nuts 17. This combination or arrangement of bars, wheels and belting keeps a constant relation between the wheels, that is, any set of parallel diameters, one of which is in each wheel, will remain parallel. Thus any diameter in wheel 7 will remain parallel to its parallel diameter in wheel 4 and therefore, if wheel 4 is held in a non rotatable position as hereinafter to be described, wheel 7 through the agency of its intermediate wheels, bars, and belting, may be moved to any position on the drawing board within the limits of its range, but it will move in a non rotatable motion. Likewise if wheel 4 is rotated on its axis in either direction any number of degrees, then wheel 7 will rotate on its axis the same number of degrees in the same direction.

The wheel 7 which is the head proper of the machine, is provided with a flange *d* (Fig. 13) on the under side of the wheel 7, said flange *d* being of the same diameter as the wheels 4, 5, and 6. The wheel 7 is also provided with recesses 28 in its rim or periphery 29, which recesses are preferably arranged at a distance of 15 degrees apart, said wheel 7 is further provided with a scale graduated in degrees on its upper surface, commencing at zero and numbered each side of zero in series of 15 degrees and each of these numbers is preferably directly over one of the recesses 28 in the rim 29.

The wheel 7 is located between the plates 18 and 19 which plates with the wheel or independently of it pivot or rotate on the pivot 11 between the rigid parallel bars 3 in the frame work of the doubled jointed arm as hereinbefore described. The lower plate 19 is narrow and has an enlarged end or lug 20 fastened to it, (Fig. 13) which lug has a ledge, on which an axle or pivot 25 of a spring stop or catch 21 is located. The plate 18, (Fig. 10) projects over the edge of the wheel 7 to support two clamps hereinafter described. The lower plate 19 also projects beyond the edge of the wheel 7 and is secured to the plate 18 preferably by means of the two small screws 24 which pass through the upper plate 18 and screw into the lug 20 of the lower plate 19.

The spring stop and catch 21, (Fig. 12) works on a shouldered axle 25, one end of which screws into the ledge of the lug 20 of plate 19 while the other end passes through plate 18 and is secured there by means of the binding nut 26. Into one end of the spring stop or catch 21 is screwed the tapered pin or point 27 which works into the said recesses 28 through the rim 29 of the wheel 7 and which recesses are arranged along the rim preferably at a distance of 15 degrees apart, thus allowing the adjustable or revolving attachments to the head to be set rapidly, conveniently, and rigidly at distances of 15 degrees apart along the edge of the wheel 7 which keeps a constant non-rotatable position, as the head is being moved about on the drawing board.

To the under side of the plate 18 is fastened a lug or block 30 preferably by means of small screws 31 and into this block is fastened one end of a spring 32, (Fig. 12) which presses against the catch 21 and keeps the pin 27 in the recesses 28 as hereinbefore described. The object of the taper on the point 27 is to make it easier to insert the point 27 into the recesses 28 and

also to take up any slack or wear at the recesses 28 and pin 27, as the spring 32 presses the point 27 into the recesses 28.

To the upper side of the plate 18 is fastened a flat spring 33 (Fig. 10) preferably by means of the small screws 34. This spring has an enlarged end or point 35 which passes through a hole in the plate 18, (Fig. 18) and when free, is even with the lower surface of the plate 18.

To keep the point 27 of the catch 21 out of engagement with the wheel 7, or recesses 28 in wheel 7, draw the point 27 away from said wheel and press down on the spring 33 (Fig. 18) and thereby bring its point 35 in contact with the recess 36 in the front edge of catch 21 and it will be held there by means of the spring 32 keeping the catch 21 against the point 35. Under these conditions the plates 18 and 19 are free to revolve on the axle 11 and about the wheel 7. To again engage the point 27 with the wheel 7 or its recesses 28, draw the point 27 away from the point 35 of the spring 33 which point will spring to its former position and thus release its engagement with the catch 21 and allow the point 27 to catch into any of the recesses 28 in wheel 7 as hereinbefore described.

In the spring stop or catch 21 is a clamp screw 37, (Fig. 12) which passes through the part 38 of the catch 21 and screws into the main part of the catch, thus taking up any wear about the axle or pivot 25.

To the under side of the plate 18, (Fig. 10) is fastened the clamps 22 and 23 for the purpose of clamping the rules hereinafter to be described, to said head of machine. These clamps have long parallel jaws which spring apart but are drawn toward each other by means of the clamping bolt 42 passing through one jaw and screwing into the other jaw, (Figs. 12 and 14). The inner surface of said parallel jaws form a dovetail slot, that is; the inner surface of the jaws are non-parallel flat surfaces which are closest together at the lower edge of said surfaces where the edges of said jaws are parallel. Clamp 22 is rigidly secured to the under side of plate 18, preferably by means of two small screws 39, and the adjustable clamp 23 is also secured to the under side of plate 18 but by means of a screw 39, which serves as a pivot, and the adjustable clamping screw 40, (Fig. 15) which passes through a slot or large hole in the clamp 23 and screws into the plate 18 and is held there by means of its binding nut 41. This adjustment pivots on the small screw 39 and enables the clamp 23 to be set perpendicular to the clamp 22. Clamp 22 is preferably secured rigidly to plate 18 but it is manifest that said clamp may be adjustably secured to said plate in the same way that clamp 23 is secured to the plate.

The rules 43 are of substantial width and quite thin and may be any desired length. The center 50 (Fig. 16) is made of some hard or stiffening material, preferably of hard wood, or steel, to allow it to be flexible in the direction of its thickness and still to be rigid in the opposite direction. The long edges of the rule are made of some hard, transparent and flexible material 51, one long edge of each being jointed and secured to the long edges of the center 50, preferably by means of a tongue and groove joint and suitable cement. In this way we get a thin and long rule of considerable width so that when the rule lies flat on the



drawing surface with one end secured in clamps of the machine that the rule will be rigid in the direction of lines drawn along the long edges of said rules but flexible in the opposite direction, so that when the rule lies flat upon the drawing surface, one end of said rule may be lifted from the drawing surface, while the other end with a considerable length of the rule may be held in contact with the drawing surface. Since the edges of the rule are transparent the rule can be set to any point or line rapidly or easily, for when the line is under the rule it may be seen before it appears from under the rule. The outer or transparent and flexible edges of the rules are thin enough to enable the proper use of the inking pens and not cause blots while the ink lines are drawn along the edges of the rules, but they may be made thinner than the centers 50 by beveling their upper surfaces toward their outer edges (Fig. 16) these rules are graduated and numbered on their under sides preferably by having said graduations or numbers cut or stamped into the transparent edges so that the marks may be protected from wear against the drawing surface and furthermore to bring said graduations close to any line to insure accuracy in measurement and also to enable lines to be drawn in ink or in pencil in any desired length. The graduations along the edges have the zero mark a short distance inward from the end of the rule and the corners of the rules are beveled for the purpose of allowing them to be adjusted perpendicular to each other and bring the zero marks on their adjacent edges to coincide whereby a complete right angle may be formed. To the upper side of the rule 43, (Figs. 10 and 12) is fastened an adjustable, rigid, metallic plate 44, by a screw or rivet 45 at one end, and at the other end by means of an adjustable clamping screw 46, (Fig. 16) which passes through a recess in the center 50 of the rule and screws into the plate 44 by passing through a slot or larger hole in plate 47 (Fig. 16) which is sunk in and fastened to the upper surface of the rule by means of the screws or rivet 48. This adjustment is for the purpose of adjusting all the rules so they will draw the same line, without altering the set of the machine, when each rule is clamped into the same clamp which may be either clamp 22 or clamp 23, thus allowing the rules to be interchangeable. The edges of the plates 44 are straight and parallel but a cross section of said plates (Fig. 16) is dovetailed in form being smallest at the bottom to conform with the beveled surfaces on the inner side of the jaws of the clamps 22 and 23, as hereinbefore described, (Figs. 14, 15, 16). This is to prevent the rules from slipping out of the clamps. A plate 44 may be secured to each end of the rule 43 thus providing means whereby either end of the scaled rules may be secured to the clamps. By this mode of construction and adjustment of the rules in the clamps, the zero points of adjacent edges may be brought coincident or they may be left a short distance apart and the zero points on the opposite edges of the rules will be exposed to view and not be interfered with by either the clamps or wheels 7, further the rules may be moved or interchanged and can be replaced quickly and accurately.

In the plate 18 is an opening 49 (Fig. 10) through which may be seen, upon the wheel 7 when the point 27 (Fig. 12) of the catch 21 is in one of the recesses 28,

the degree which the rule 43, secured in clamp 22, makes with a horizontal line of the drawing, that is with a line drawn along the edges of the rule 43, when the zero mark appears in said opening.

The wheel 4 (Fig. 2) the plate 52 and 53 and their cross bar 54, the adjusting nuts and bar 56 and 57, the index arm 59 and the anchoring plate 61 with its projecting rigid parallel arms 62 and 63, with their centering points, or pivoting points 64 and 65, constitute the anchor and the support of the machine.

The plates 52 and 53 and their cross bar 54 which are fastened together preferably by the screws 55, constitute the frame of the support. The plate 52 is on the upper side and the plate 53 on the under side of wheel 4, and together are free to pivot or revolve on the axle 8, of the wheel 4 which axle is located between and secured to the outer extremity of the bars of the jointed arms Z as hereinbefore described. The wheel 4 has a rigid projecting index arm 59, preferably secured to the upper side of said wheel by the screws 60. This index arm 59 is located on the wheel 4 within the limits of an opening in the plate 52, said opening having an arc edge whose center is at the axle or pivot 8. The projecting extremity of the index arm 59 keeps in close contact with the arc edge of said opening and an index mark on the upper surface and at the said extremity keeps in contact with a scale 67 graduated every degree preferably to 15 degrees both ways from a zero mark, said scale being marked on the upper surface of plate 52 and at the arc edge of the opening of said plate.

I have shown the graduations of 15 degrees and its multiples on the head 7 of the machine and those from 1 to 15, on the support, but it is manifest that all the graduations may be at the support by increasing the size of the opening in plate 52 and the length of the adjusting bolt 57.

Wheel 4 is rotated on its axle 8 with reference to plate 52 and the index mark on the index arm 59 is held rigidly at any of the marks in the scale 67 by the right and left threaded adjusting bolt 57, (Figs. 2 and 6) which works in correspondingly threaded nuts 56 one of which is secured to the upper surface of plate 52 and the other to the upper surface of the index arm 59 by the screws 58 which also allow the nuts 56 to pivot in order to keep in line with the adjusting bolt 57, as the wheel 4 rotates on its axle 8.

The anchor for the machine is fastened to the drawing board or table by means of two screws through the holes 68 in the plate 61. This plate has two projecting rigid, parallel arms 62 and 63 which carry two tapered centering points 64 and 65, (Fig. 7). These catch into cavities in the ends of the cross bar 54 of the frame in the support. The cavities are made with tapering sides to conform with the taper of the centering, or pivoting points 64 and 65. The centering point 64 is a fixed point but the centering point 65 may be drawn inward or outward by means of its threaded bolt 69 which may be held in any position by the set screw 66. The points 64 and 65 being tapered and the point 65 being adjustable, enables the machine to be easily removed from the anchor and to be easily and rigidly replaced with exactness. The projecting arm 62 and 63 of the plate 61 enables the anchoring plate to be fastened to the upper surface of



the board or table or to the edge of the board, as shown in broken line in Fig. 5. The centering points 64 and 65 being round and tapered enables a free use of the entire machine in a revolving motion about a line as  
 5 axis, which lies between the centering points 64 and 65, thus forming a hinge and allowing the machine to be raised up so as to be out of the way while paper is being fastened to the drawing board.

An adjustable anchor (Fig. 8) for the machine is fastened to the drawing board, or table, by two screws  
 10 through the holes 70 in the plate 71. An adjustable plate 72 is fastened to the plate 71 by a screw 73 at one end, which forms a pivot for the plate 72, and at the other end is fastened by an adjustable screw 74, (Fig.  
 15 9) which passes through a slot or large hole 75 in plate 72 and screws into plate 71. The plate 72 has two projecting, rigid, parallel arms 76 and 77. Into the arm 76 is secured a round tapered pivot or centering point 78 and into the arm 77 is screwed an adjustable  
 20 tapered centering point 79 which may be held secure in any position by the set screw 80. The centering points 78 and 79 are for the purpose of catching into the cavities in the ends of the cross bar 54 of the frame of the support of the machine as hereinbefore described.  
 25 This adjustable anchor serves the purpose of using two or more anchors on the same drawing board and enables the lines between their centering points to be easily set in alinement, or parallel with each other, so the machine may be easily used from any of the an-  
 30 chors on the same drawing. The machine may be folded so as to occupy a comparatively small space by revolving wheel 6 to meet either side of the wheel 4 and then to revolve wheel 7, or head of machine, to meet wheel 5.

35 The machine may be adjusted and operated as follows; Starting with the machine fixed to the drafting board with the zero point on the wheel 7 appearing through the hole 49 and the wheel 4 set on the zero point, the machine is then adjusted to draw all lines  
 40 parallel with or at right angles to a line drawn longitudinally through the clamp 22 and the center of the rule therein secured, and all that is necessary is to grasp the head of the machine and move the rules to the desired position. If it is desired to draw lines parallel  
 45 to any other angle say a variation of 16 degrees, then the operator presses upon the lever 21 which withdraws the pin 27 from the recess 28 and then turns the plate 18 with the rules till the number 15 appears in the opening 49, then the wheel 4 is moved till it reg-  
 50 isters 1 degree and the machine is ready to draw lines parallel and at right angles to a variation of 16 degrees, from a line drawn along said rule when the zero point appears in opening 49. If it is desired to draw lines at right angles to each other then the rules are adjusted  
 55 in the clamps 22 and 23 till the zero mark on each rule coincide and draw from that point then by moving the jointed arm Z, any number of right angles may be drawn parallel to the first. To release the machine from anchors which anchor the machine to the draft-  
 60 ing board, loose the screw 66 and draw the pivoting point 65 from its socket.

Having now described my invention what I claim is;

1. In combination with a drafting board, a head, clamps secured to the head, scaled rules, means for adjustably  
 65 attaching the rules in the clamps with their zero points

coincident, means for securing the rules in their adjusted positions, and means connected with the head for carrying the rules upon the board in the same direction and same plane whereby lines at right angles and parallel to each other may be drawn and measured on the board at the  
 70 same time and without change in the set of the machine.

2. In combination with a drafting board, a head, clamps secured to means pivoted in the head, rules adjustably set in the clamps and provided with means for setting their zero points coincident, and means connected with  
 75 the head for controlling the movement of the rules upon the drafting surface.

3. In combination with a drafting board, a head graduated in degrees, clamps pivoted in the head, rules adjustably set in the clamps with their zero points coinci-  
 80 dent, means connected with the head for controlling the movement of said rules upon the drafting surface, and means connected with the head for changing the angle of direction of the rules on the drafting surface.

4. In combination with a drafting machine, a head, a  
 85 clamp secured to means pivoted to the head, a rule secured in the clamp and adapted to be longitudinally adjusted, and means connected with the head for controlling the longitudinal or transverse movement of the rule to the different positions along the drafting surface.  
 90

5. In combination with a drafting surface, a head graduated in degrees, a clamp attached to the head, a rule adjustably secured in the clamp, means connected to the head for controlling the movement of the rule along the drafting surface, and means connected with the head  
 95 for adjusting the rule to draw lines at different angles.

6. In combination with a drafting surface, a head, a plate pivotally secured to the head, a clamp attached to said plate, a rule adjustably secured to said clamp, and means attached to the head for controlling the movement  
 100 of the rule upon the drafting surface.

7. In combination with a drafting surface, a head, a rule, a clamp attached to the head said clamp having movable jaws, means for bringing the jaws into engage-  
 105 ment with the rule, and means attached to the head for controlling the movement of the rule as it is moved over the drafting surface.

8. In combination with a drafting surface, a head, a clamp secured to a plate pivoted to the head, a rule adjustably secured in the clamp, and means pivotally  
 110 attached to the head on the pivot of the clamp for controlling the movement of the rule along the surface of the drafting board.

9. In combination with a drafting surface, a head graduated in degrees, a plate secured to the head, a  
 115 clamp attached to the plate, a rule adjustably secured in the clamp, means connected with the head for changing the direction of the rule to any angle on the drafting surface, means for holding it in its changed position, and means connected with the head and drafting surface for  
 120 controlling the movement of the rule upon the drafting surface.

10. In combination with a drafting surface, a head graduated in degrees, a support graduated in degrees, a rule attached to the head, means connected with the  
 125 head and support for controlling the movement of the rule along the drafting surface, and means connected with the head and support for changing the angle of direction of lines drawn along the rules.

11. In combination with a drafting board, a head pro-  
 130 vided with degrees graduated thereon, a rule removably attached to the head a support with degrees graduated thereon, a jointed arm pivoted to the head and to the support, and means connected with the head and support for changing the angle of the movement of the rule on  
 135 the drafting surface.

12. In a device of the character described, a head graduated in degrees, a clamp secured to a member pivoted in said head, a rule adjustably and removably set in said clamp, a fixed support graduated in degrees, a jointed  
 140 arm attached to the head and said support for carrying the rule to different positions on the drafting surface, and means connected with the head and support for setting the rule at different angles on the drafting surface.

13. In a device of the character described, a head, a  
 145



support graduated in degrees, a clamp, means for pivoting the clamp in the head, a rule secured to the clamp, means connected with the support for setting the rule at different angles, and means connected with the head and support for controlling the movement of the rule along the drafting surface when set at different angles.

14. In combination with a drafting board, a head, a support graduated in degrees, a rule removably attached to the head, a jointed arm pivoted in the head and to the graduated support for controlling the movement of the rule upon the drafting surface, and means connected with the support for changing the angle of the direction of the rule.

15. In combination with a drafting surface, a head graduated in degrees, a clamp adjustably pivoted to the head, a support graduated in degrees, a rule adjustably secured to the clamp and a jointed arm connecting the head and graduated support for controlling the movement of the rules upon the drafting surface at different angles whereby parallel lines and lines at angles may be drawn along the edges of the rules.

16. In combination with a drafting board, a head, a rule attached to the head, a support graduated in degrees, means connected with the head and support for controlling the movement of the rule along the drafting surface, and means connected to the support for changing the angle of direction of the rule on the drafting surface.

17. In combination with a drafting board, a head, a rule secured to the head, a support secured to the board, means attached to the head for carrying the rule to various points upon the drafting surface consisting of a jointed arm provided with a wheel pivoted therein said arm pivoted at one end to the head and at the other end to the support, and means for holding the wheels from rotating while the rule is moved upon the drafting surface.

18. In combination with a drafting surface, a head, a plate pivoted in the head, a clamp with adjustable parallel jaws secured to said plate, a rule, and means connected with the clamp for adjustably securing the rule in said clamp, and means connected with the head for controlling the movement of the rule on the drafting surface.

19. In combination with a drafting board, a head graduated in degrees, a support, clamps pivoted to the head, scaled rules removably secured in the clamps, means connected with the head and support for carrying the rules consisting of a jointed arm formed in sections and pivoted on common centers and one end of the jointed arm pivoted to the support, and the other end pivoted in the head, and means connected with the head for changing the angles of the rules.

20. In a device of the character described, a head, a support secured to the drafting board, an adjustable clamp, means for pivoting the clamp to the head, a rule adjustably set in the clamp, and a jointed arm formed in sections, each section consisting of two bars pivoted at each of their ends on opposite sides of a wheel and the jointed arm pivoted at one end to the head and the other end to the fixed support.

21. In combination with a drafting board, a head graduated in degrees, a support graduated in degrees and secured to the drafting board, a clamp pivoted in the head, a rule adjustably secured in the clamp, a jointed arm formed in sections each section consisting of two bars pivoted at each of their ends to a common center and the jointed arm pivoted at one end in the head and at its other end to the support, and means connected with the head and support for setting the rules to different angles.

22. In combination with a drafting surface, a head, a clamp, a rule secured in the clamp, and means for adjusting the rule longitudinally and transversely in the clamp.

23. In combination with a drafting surface, a head, a clamp, a rule, means for adjustably securing the rule in the clamp to adapt it to be longitudinally adjusted, and means connected with the head for controlling the movement of the rule as it is manually moved on the drafting surface.

24. In combination with a drafting surface, a head, a rule secured to the head, a support graduated in degrees and rigidly secured to the drafting surface, means connected to the head and support for controlling the movement of the rule upon the drafting surface, and means connected to the support for setting the rule in different angles.

25. In combination with a drafting surface, a head, a clamp secured to the head, a flexible transparent rule provided with a scale on its under side next to the drafting surface secured in the clamp and means for securing the rule in longitudinally adjusted positions in the clamp, and means connected with the head and drafting surface for controlling the movement of the rule longitudinally and transversely on the drafting surface.

26. In combination with a drafting surface, a head, a clamp, a rule attached to the clamp, means for holding the rule in its longitudinal or transverse adjustment in the clamp, a support, and means attached to the head for carrying the rule upon the drafting surface consisting of a jointed arm attached at one end to the head and the other end to the support.

27. In combination with a drafting surface, a head, rules attached to the head, a support, and means connecting the head with the support for carrying the rules on the drafting surface, consisting of plates or wheels and a jointed arm formed in sections, the sections pivoted together on opposite sides of a plate or wheel and an endless belt adapted to travel around each section.

28. In combination with a drafting surface, a head, a clamp attached to the head, a rule, means for securing the rule in the clamp and adapting it for longitudinal adjustment consisting of a plate secured to the rule, means connected with the clamp for engaging the plate, and means attached to the head for carrying the rule upon the drafting surface.

29. In combination with a drafting surface, a head, a clamp secured to the head, a rule, means for securing the rule in the clamp to adapt the rule to be adjusted both longitudinally and transversely consisting of a lower plate secured in the rule and provided with a slot, an upper plate secured on the rule over the lower plate, an adjusting screw passing up through the rule and slot in lower plate and engaging the upper plate, means in the clamp for engaging the upper plate, and means attached to the head for carrying the rule upon the drafting surface.

30. In combination with a drafting board, a head, a support, a rule attached to the head and a jointed arm formed in sections *a*, *b*, and *c* formed of bars, wheels and belts, section *c* provided with two bars pivoted at one end on opposite sides of the head to a common center and at the other end secured to opposite ends of the axle of a wheel 6, section *b* having two bars pivoted on opposite ends of the axle of the wheels 5 and 6 and section *a*, secured at one end to the opposite ends of the axle of the wheel 5 and at the other end secured to the pivot on opposite sides of the fixed support and a belt adapted to travel around each section whereby the rule is moved in parallel planes upon the drafting surface.

WESLEY WILLIAM CLAUS.

Witnesses:

JAMES CARLTON NELSON,  
CHARLES JOHN EVEN.